

ARCHIVES OF OTOLOGY.

REPORT OF A CASE OF DOUBLE MASTOIDITIS WITH EXTENSIVE INVOLVEMENT OF THE ZYGOMATIC CELLS.¹

By W. P. BRANDEGEE, M.D.

(With one photograph on Text-Plate I.)

I HAVE chosen to report this case of double mastoiditis for two reasons: First, because it demonstrates so well the rapidity of bone destruction due to streptococcus invasion, and secondly, because it emphasizes the views advanced by Whiting and others, namely, that no mastoid operation is complete until the zygomatic cells are thoroughly explored.

On December 27th last, I saw the patient, Tony N., an Italian fifteen years of age, who gave the following history:

He had had a severe attack of grip for two weeks, and during the last eight days had suffered with great pain in both ears. This pain had become so severe that sleep had been impossible for the past four nights. He had never had any aural disturbance before this attack, and his general health had been good. The patient's body was covered with a profuse cold perspiration, both pupils were dilated, the pulse was 92 and the temperature $103\frac{1}{2}^{\circ}$ F. In fact, the picture was one of profound sepsis. An aural examination showed that both external canals were filled with pus, the posterior superior canal walls were highly injected and bulging, while the fundus of each canal was narrowed and there were small perforations in both membranæ tympani through which pus was exuding. There was a marked tenderness on deep pressure over both mastoid antra and tips. Imme-

¹ Read before the Section on Otology, New York Academy of Medicine, February 9, 1905.

diate operation was advised, and the patient was admitted to the New York Eye and Ear Infirmary.

The case was put on the operating table and chloroform was administered for the reason that some coarse bronchial râles were present.

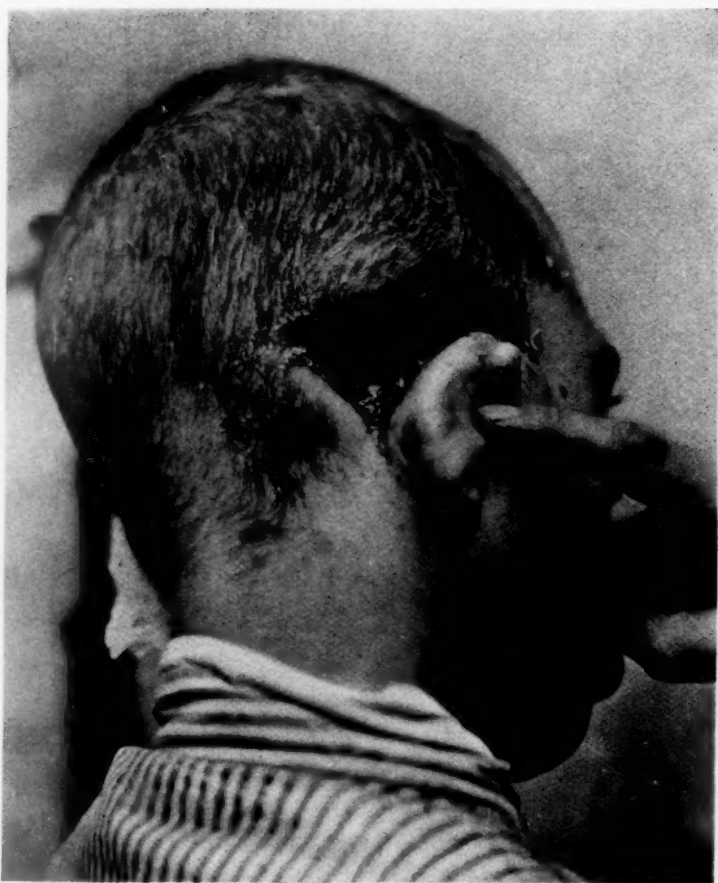
Operation on Right Ear.—The usual curvilinear incision was made, and after the periosteum had been reflected the bone was exposed. The cortex was found to be discolored and a small perforation had taken place over the antrum. The probe introduced through this perforation passed forward, upward, and inward into the middle ear, while downward it extended to a large cavity toward the tip. The necrotic cortex was curetted away and exposed a cavity filled with foetid pus and granulations. The diseased area ran so far backward and upward that the curvilinear incision did not give sufficient exposure, and a horizontal incision from the posterior flap of the wound backward an inch and a half was necessary. The mastoid tip was ablated with rongeur forceps, and on removing the bone deep down the lateral sinus was uncovered at the knee for a space of more than one inch before sound bone was encountered. The dura was also uncovered just above the antrum. The aditus was thoroughly curetted, and in exploring the superior wall the probe led into the deep zygomatic cells. Again it was necessary to prolong the curvilinear incision forward an inch and a half toward the external canthus to expose the zygomatic cells. After the temporal muscle had been elevated from its position upward, the zygomatic cells were broken down by rongeur and curette.

These cells were filled with pus and were extremely large, one cell apparently leading into another. So much destruction was present here that the entire posterior zygomatic root was honey-combed and it was necessary to ablate it.

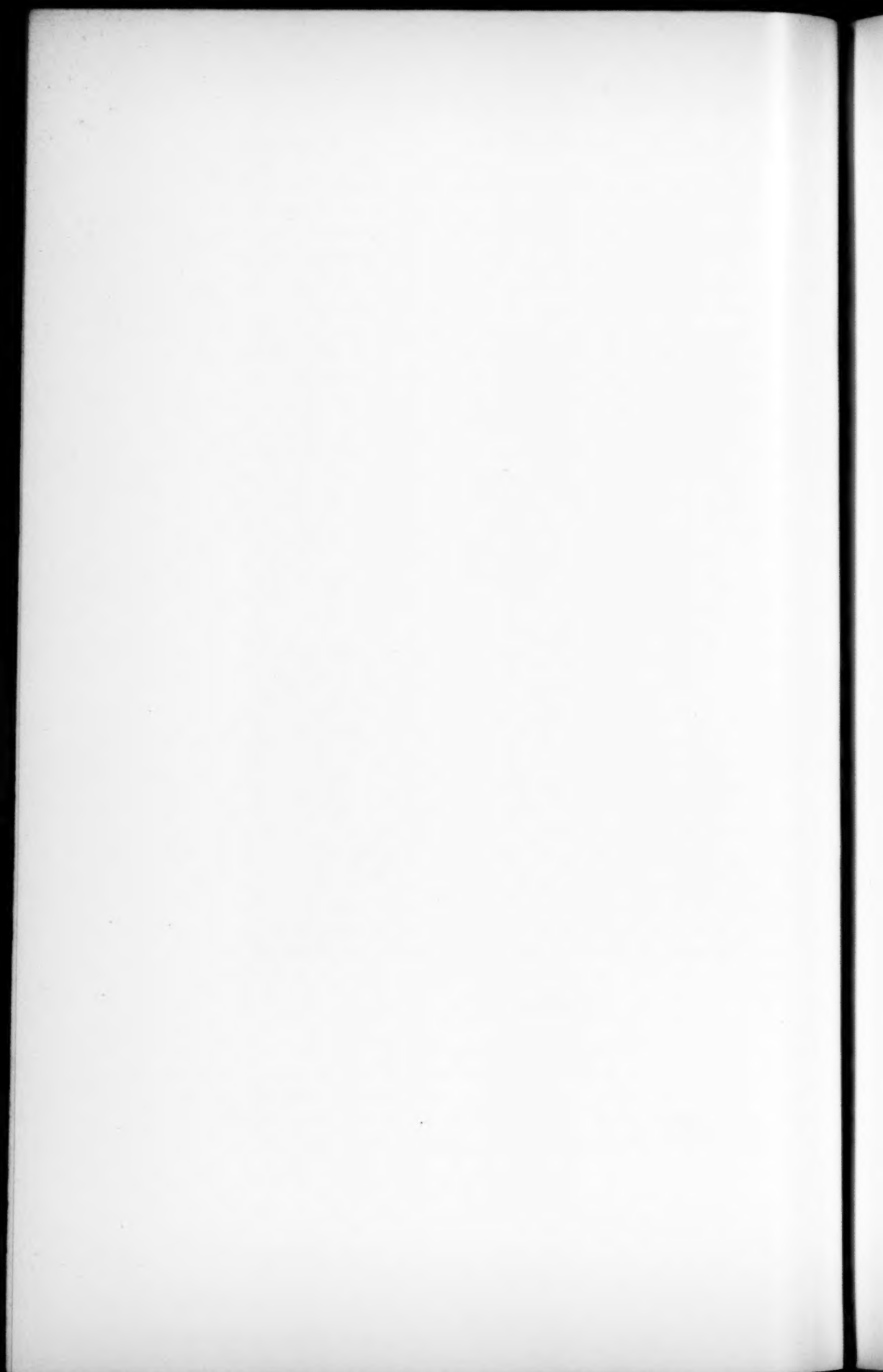
After the large cavity formed by the removal of necrotic bone had been thoroughly curetted and cleansed, a temporary light dressing was applied. Necessary steps were then taken for the—

Operation on Left Ear.—The usual mastoid incision was also made on the left side, and the usual mastoid operation was done. The cortex was very thin and the bone destruction was so great that a horizontal incision and a curvilinear incision forward for a distance of an inch and a half was necessary before the parts were finally exposed enough to complete the operation.

On the left side the sinus and dura were also exposed in about



TO ILLUSTRATE DR. BRANDEGEE'S CASE OF ACUTE MASTOIDITIS WITH
EXTENSIVE INVOLVEMENT OF THE ZYGOMATIC CELLS.



the same position as on the right side, while ablation of the zygomatic cells at the posterior root was necessary. After the large cavity was curetted and cleansed, both wounds were packed with iodoform gauze and the patient returned to the ward.

The time of the operation was two hours, but the depth and extent of the invasion necessitated very careful dissection.

It is interesting to note that the pus taken from both wounds at the time of the operation showed pure culture of streptococci with a few pneumococci, and that the blood count, while showing a mild leucocytosis, gave a polynuclear percentage of 84.

The involvement of the zygomatic cells in this case was the most extensive that the operator has ever seen, and the surprising rapidity of the infection seemed most remarkable.

The accompanying photograph, taken three weeks after the operation, gives a fair idea of the depth and extent of the wound.

Five days after operation, the condition of the patient was complicated by pneumonia, which involved the infrascapular region posteriorly in both right and left lungs. This pneumonia fortunately ran a rather mild course, consolidation diminishing in about nine days, while resolution was complete in about seven days more.

The temperature, when the patient was admitted to the hospital was 104° F., and arose the second day after the operation to its highest point, 105½° F., but, after the resolution of the pneumonia took place, gradually fell to normal. The boy made an absolutely uneventful recovery, and was dismissed from the hospital four weeks after the operation. Despite the enormous size of the wounds, there is but little deformity on either side, while the hearing has not been disturbed.

SECONDARY ANÆSTHESIA HEMIPLEGIA AS A COMPLICATION OF THE MASTOID OPERATION.

By W. G. B. HARLAND, M.D.,

INSTRUCTOR IN LARYNGOLOGY, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA.

ATTENTION has been called by Garrigues,¹ Büdinger,² Krumm,³ and others to cases of what they term anæsthesia paralysis. In such cases paralysis of arm, leg, etc., has followed the administration of an anæsthetic—being hysterical, or due to central, reflex, or peripheral causes.⁴ The following case of hemiplegia is interesting because it adds another to the small list of cases of central anæsthesia paralysis, and because, occurring as a complication of the mastoid operation, it was at first glance thought to be due to cerebral abscess. It is probable the middle cerebral vessels were injured during instrumental delivery at birth, and the consequent paralysis, latent for years, was made evident and deepened by circulatory changes incident to prolonged etherization during mastoid operation.

Leo B., a school-boy of eight years of age, entered the Presbyterian Hospital, February 12, 1904, and was operated upon next day for abscess of left mastoid. History given at that time was meagre—he had had discharge from both ears since an attack of scarlet-fever four years before, and in the preceding June inflammation of left ear had led the attending physicians to make an incision down to the bone back of the auricle, which measure had relieved the child.

When first seen the boy looked rather fat and phlegmatic, and not particularly ill. There was considerable purulent discharge

from both ears; the left auricle was pressed out by the swelling over the mastoid, and there was much local pain and tenderness in this region. Respirations were 24; pulse was 120; temperature $99\frac{1}{4}^{\circ}$ F. February 13th, under ether, incision was made back of auricle through tissues infiltrated with discharge from a small opening in the mastoid process. The mastoid was found riddled with foul pus, necessitating extensive curettement, in the course of which the lateral sinus was uncovered for half an inch, but not disturbed. The roof of the middle ear was left intact. Tympanum, antrum, and mastoid cells were cleared into one large cavity; the operation lasting one hour, and patient standing it very well. The wound was freely drained with gauze and dressed in the usual manner. The boy came out from under the anæsthetic in a perfectly natural way, and presented nothing unusual, except that for about five days his stomach would not retain nourishment, and it was noticed that there was considerable loss of power in the left arm and leg, together with some paralysis (?) of mouth and face, the exact nature of which was obscure. Temperature ranged from $97\frac{3}{4}^{\circ}$ to $100\frac{1}{4}^{\circ}$; pulse from 102 to 140; respiration from 20 to 26; all coming to about normal by February 17th. A careful examination of the heart proved it to be entirely normal. The eye-grounds and muscles, examined by Dr. William T. Shoemaker, were found normal. The boy's mental condition was good—he was not irritable, nor had he marked headache. By accident, urine for specimen before operation was voided at stool. Urine, February 13th, gave evidence of kidney disturbance: Sp. gr. 1.038, acid, amber yellow, albumen moderate amount, some hyaline and granular casts, a few epithelial cells and leucocytes. February 24th: 1.026, trace albumen, hyaline and granular casts, mucus, few crystals cerium oxalate. Blood was not examined. Strych. sulph. gr. $\frac{1}{8}$ every four hours was given when pulse went above 120, and the boy was kept in bed; later potass. iodid. was given in increasing doses for a few weeks, beginning with gr. 3 t. i. d. Electricity was applied to arm and leg. The wound was dressed on February 16th, and every day thereafter. The patient was able to get up February 23d, and went home March 5th. Respiration at that time 20, pulse 72, temperature $98\frac{3}{4}^{\circ}$.

The occurrence of left hemiplegia after operation on left mastoid was puzzling, and at first unexplainable. It was

evidently cerebral and due to lesion limited to the right motor area; syphilis, embolism, apoplexy, and cerebral abscess, the last especially, were carefully considered as possible causes. An examination of the muscles and nervous system, made by Dr. T. H. Weisenberg, seemed to prove what had not been suspected, namely, that hemiplegia in latent form had antedated operation. The notes of this examination are as follows:

"After the mastoid operation, it was noticed when the boy talked the mouth was moved more than usual and the face was drawn to the left (?), also that his left arm was stiff and could not be used as well as before. The mother is positive that before operation the boy had no paralysis.

"Examination shows typical gait of hemiplegia. The left upper and lower limbs are spastic and held rigidly to the side and are contractured. Grip of left hand is weak compared with right; resistance to passive motion is diminished at left elbow and left knee. The left lower limb measures less than the right, the difference being about half an inch above the knee. There is also a difference in the measurements of the upper limbs, the left forearm and arm being distinctly smaller in size than the right. All tendon reflexes in the left upper and lower limbs are increased. Ankle clonus is not obtained, but plantar irritation produced distinct extension of the big toe. Sensation is not altered. The lower distribution of the left seventh nerve is paretic, the upper distribution being normal. The pupils are equal and respond promptly to light, accommodation, and convergence. The extraocular movements are normal. The tongue protrudes straight, there being no tremor nor atrophy. The patient has not complained of headache, though for a day or two he had nausea and vomited. The electrical reactions are normal. The right side shows no pathological conditions. Subsequent examinations showed no alterations. There is present, therefore, a typical left hemiplegia, which must have been of long duration to have caused the atrophy of the left arm and left leg, as such atrophy certainly could not have occurred in the short time that had elapsed since operation."

Careful questioning elicited the following previous history, which makes it possible to assign a cause for the primary hemiplegia:

Family history is good; all members of three living generations are in good health, and have never had any serious diseases, except the boy's father, who had typhoid fever. The mother had a miscarriage after Leo was born, but afterwards had a healthy child; another older child is perfectly healthy. She had a miscarriage again a year ago.

When the boy was born, forceps were used, and when he began to walk, at one and a half years of age, it was noticed that his left foot turned inwards. His left leg has been somewhat weaker than the right, but no importance was attached to this. Ever since an attack of scarlet-fever, at the age of five, the boy has had difficulty in speaking, screwing up his mouth and twisting it as he talked; the fever kept him in bed six weeks, and was followed by an attack of rheumatism. The fever also started a purulent discharge from both ears, that ended in an attack of mastoiditis in June, 1903, as we have seen, and in February, 1904, the complete mastoid operation was performed, followed by the appearance of an unmistakable hemiplegia.

A consideration of the etiology, with the above information in hand, made the following conclusions seem most reasonable.

Syphilis could hardly have caused such marked hemiplegia so abruptly, and there were no other evidences of specific disease, except possibly in the history of miscarriages.

Embolism would not likely occur in the right motor area from operation on left mastoid; there was no valvular disease nor other point of origin for the embolus. Then, too, there were no convulsions, headache, nor period of unconsciousness, nor marked fever.

Cerebral abscess of one side from ear lesion on the other side, though rare, does occur. Politzer^b refers to cases of this kind (reported by v. Tröltsch, Magnus, and others), regarded by him as cases of pyæmic metastasis. Mills had such a case, the abscess being found, upon operation, in the

right motor area, although the left ear was probably the source of infection. But there would be other symptoms besides the loss of power: headache, mental disturbances, and perhaps optic-nerve changes, with general asthenia—symptoms absent in this case.

It might be thought possible that brain abscess on the right side had developed slowly from the right ear discharge, and that a prolonged operation had favored its increase, making its presence more evident. Dench^{*} refers particularly to the possibility of brain abscesses remaining latent in this way. On the other hand, abscesses of otitic origin very rarely affect the motor area, and, in any event, would produce general asthenia, somnolence, headache, and possibly a slow pulse.

Apoplexy sufficient to cause hemiplegia might occur during prolonged etherization, though very few cases have been reported.⁷ This attack would be accompanied by marked symptoms, such as unconsciousness, stertorous respiration, slow, full pulse, and by febrile reaction. There would be no immediate wasting of the paralyzed limbs.⁸ As the first were lacking, and wasting was present, it is evident that primary apoplexy was not the cause of hemiplegia in the case under discussion.

Neither was it a case of pressure paralysis, for such cases are characterized by sensory disturbances as well as by loss of power. These disturbances may be represented by tingling and numbness, or be limited to sensitive points found by pressure along the course of the nerve involved; the electric excitability of the limb is diminished and the muscles contract slowly; ordinarily the arm only is affected.

Assuming that hemiplegia antedated operation, we find in forceps delivery a satisfactory cause for the condition. Hemorrhage from a middle meningeal or middle cerebral vessel could cause hemiplegia, evidences of which might largely disappear before the child began to walk at one and a half years of age. Atrophy of the cortex, leading to wasting of the limbs, would occur, and the resulting slight weakness of the leg and arm might not be noticed if situated on the left side. Hemorrhage from the middle

meningeal would probably be absorbed, leaving only a slightly thickened dura, or possibly a cyst. If a middle cerebral vessel were affected, on the other hand, a condition similar to embolism would be produced. The blood supply to the cortex beyond would be lessened, some atrophy and softening of the brain at that part would take place, and the nerve cells, which later recovered and took charge of the innervation of the affected arm and leg, would be weaker and less stable than normal.

Supposing then a hemiplegia caused at birth by forceps, what condition during mastoid operation could account for the return of hemiplegia? There is certainly nothing in the operation itself to account for it, and the only other probable factors are the anæsthetic and the renal disease. These might be deemed capable of producing it by affecting the blood pressure and blood supply, or by toxic action. It is easy to believe that a second hemorrhage might be induced in a person *with diseased arteries* by the disturbance of circulation attending a protracted operation under ether, though comparatively few cases are recorded. Surgeons are seldom called upon to operate upon hemiplegics under anæsthetics; replies to letters addressed to three surgeons of large experience are to the effect that they have had practically no cases of the kind. Hewitt^{*} tells of a case in the London Hospital, an elderly man, who had an apoplexy while under ether. It was learned afterwards that he had had a previous apoplectic seizure, with complete recovery. Such a case can be readily understood, but it is not easy to imagine how hemorrhage would recur in a child *with normal arteries*, at the site of former lesion, especially if previous bleeding had originated from a middle meningeal vessel. The scar present would be even less liable to bleed than normal tissue, for it must be borne in mind that anæsthetics lower blood pressure after the first slight momentary rise, nor would toxic substances have any more effect upon the old lesion than upon other parts of the brain.

One conclusion, a theory suggested by Dr. Charles W. Burr, is left, and that seems to cover the conditions present. If thrombosis or embolism of a branch of the middle cere-

bral artery occurred at birth from injury by forceps, there would have resulted an ischæmia of the cortex supplied by the vessel; partial atrophy and softening of that segment of the brain would occur with a gradual wasting of the muscles of the limbs affected. After absorption of adventitious elements, some renewal of circulation would take place in the diseased part of the brain, slight in quantity perhaps, but sufficient to restore some degree of functional power to it. Afterward any marked weakening in blood pressure or cardiac power would materially lessen the blood supply of the part of the brain that had previously suffered, entailing loss of function until circulation was again established. It is possible, too, that the equilibrium of the partly degenerated cells, or of cells that had taken upon them extra duty, might be readily overturned by the presence of toxic poisons normally excreted by the kidneys, or by the lateral action of the anæsthetic, though these factors would probably not be important.

The speech defect probably dated from scarlet-fever, and was not caused by mastoid operation. The boy is right-handed. The slight facial palsy was very likely due to the old cerebral condition and involved the lower part of the left side of the face.

The theory advanced above was strengthened by the subsequent history of the boy. After mastoid operation, when the boy had been about for some weeks, great improvement in the paralysis was noted—he could put his hand to his head, and walked about easily though awkwardly, *i. e.*, the left foot dragged and the left arm hung stiffly at his side. The toe, in walking, made a semicircular swing (cerebral gait), and the affected muscles were somewhat spastic. The left ear and mastoid wound continued to discharge foul pus, and the right ear muco-pus. As the latter did not improve, the pharyngeal tonsil, much enlarged, was removed under ethyl chloride general anæsthesia. This was on March 11, 1904; hemiplegia was notably worse immediately after this operation, but became less again in a few days. Respirations during this period ran from 20 to 24; pulse, 94 to 108; temperature, $97\frac{3}{8}^{\circ}$ to $99\frac{1}{4}^{\circ}$ F., being down in the morning (pus

absorption). Eyes were again examined with negative results: media clear, disks well defined, vessels normal. The right ear markedly improved after removal of adenoids. May 21st, under chloroform, the left mastoid was rapidly curetted and a piece of necrosed cartilage from auditory canal removed. After operation, hemiplegia was again increased, subsiding in a short time. Urine, May 20th: 1.032, acid; amber-yellow, flocculent sediment; trace albumen, no casts, a few epithelia, no leucocytes, some uric-acid crystals. May 24th: 1.025; fine sediment; ammonium-urates—otherwise same as 20th. Odor from wound and discharge ceased, and the sinus healed up, though both ears still discharge a little. The boy has improved in health. He can run and use his arms and legs for ordinary purposes, but there is still much awkwardness. Further improvement is not expected.

The temporary deepening of hemiplegia after the different anæsthetics seems to prove the correctness of the theory advanced. Had the lesion existed upon the left side of the brain, it might very easily have been mistaken for cerebral abscess and led to exploratory operation. A careful study would have prevented such an error, and this report stands as a plea for careful study in all such complications. I owe much to Dr. B. Alex. Randall, Dr. Keen, and to many others who have aided me in investigating the case.

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ON THE OPERATIVE TREATMENT OF INFECTIVE SIGMOID-SINUS THROMBOSIS.¹

By JOHN D. RICHARDS, M.D.,

ASSISTANT AURAL SURGEON, NEW YORK EYE AND EAR INFIRMARY; AURAL SURGEON TO ST. MARK'S HOSPITAL.

THE following paper is based upon the observation of forty-four consecutive operations for infective sigmoid-sinus thrombosis of otitic origin. Of this number the writer has performed fifteen. The remainder have been operated upon by different surgeons. These cases embrace a great variety of pathological conditions and represent various stages of the disease.

The method of handling these cases and the technique employed have varied with the individual operator, and a comparison of the respective methods has been afforded. The following conclusions and such divergence from the usual technique as is herein advocated have arisen from a survey of the foregoing. An attempt at an orderly and minute description of the sinus operation has not been made; merely certain points have been brought up for discussion. Such of the writer's cases as serve to illustrate the points in question will appear later as a separate paper.

As infective sigmoid-sinus thrombosis of otitic origin is with rare exception secondary to mastoid involvement, the exploration of the mastoid and the removal of its septic foci constitute the primary step of the sinus operation, and we approach the sinus through the mastoid wound after having exposed its overlying bony groove.

¹ Read in part before the Otological Section of the New York Academy of Medicine, April 13, 1905.

We should work as rapidly as possible, remembering that before the operation is concluded the patient may be overtaken by a degree of shock which necessitates an abrupt termination of the procedures. It may be necessary to explore the brain, to resect the jugular, or both; the sacrifice of time is a tremendous handicap for the patient, and rapidity in operating is at a premium. It should be our aim to do everything which we have to do, *i. e.*, to deal with all intracranial complications, at the time of the original operation, for it soon becomes apparent to those who see many of these cases that a peculiar fatality hovers over those patients who for the second time are subjected to operative interference; not that the second operation in itself so greatly adds to the gravity of the case or unfavorably influences the outcome, but it argues the error of delay when the intracranial sinuses are invaded by the micro-organisms of suppuration. We cannot do the sinus operation to-day, the jugular resection to-morrow, and get good results.

Exposure of the Sinus.—As a rule, but by no means always, we find in these infected thromboses that the septic process has extended from the mastoid by contiguity, that the overlying sinus groove has been eroded, and that this solution of continuity in the bone is the gateway through which infection has proceeded. During this quiescent period of invasion, which covers an extremely variable time limit, the dura constituting the external sinus wall frequently undergoes a slow inflammatory change and is soldered by a limiting pachymeningitis to the circumference of this hiatus at a greater or less distance from its irregular border. This opening offers an inviting point from which to commence the removal of the remaining sinus groove, but if possible we should avoid it. For it is here that the vessel is most likely to be injured; it is cemented to the sinus groove, and in our effort to separate the soft, friable, blood-soaked wall, it is easily torn. To control hemorrhage which may occur we must exert pressure at the very point at which the thrombus is most likely to be, and this mashing of the contained clot is as far as possible to be avoided. For we not infrequently see particles of a thrombus so loosely clinging to

the mass that but little manipulation would be necessary to set them loose and force them into the general circulation.

When the conditions are favorable we should expose the sinus at a point as low down and as near the bulb as is convenient for work, in the hope that the thrombosis is not so extensive as to have involved the entire vertical limb, and that the vessel at this point is not invaded. If we find the sinus wall near the bulb to be healthy and the vessel's lumen seems filled with blood, a compression plug should be placed across the vein at this point to block any particles which by chance may be detached from the clot in our endeavor to remove the remaining sinus groove, during which time the sinus and its contents suffer more or less manipulation.

If during an operation we take note of the squeezing and pressure to which these sinuses are subjected in our attempts to expose them, we find this to be considerable, and while the degree of danger which we thus incur is problematical, we should make every effort to avoid unnecessary manipulation.

As an instrument with which to expose a sinus the chisel is an excellent one. While it has been claimed that we run a greater risk of injuring the vessel with it than with other instruments, there are other factors which enter as elements of danger in these cases which the chisel particularly avoids.

When removing the sinus groove with the chisel the vessel suffers but little disturbance, for the chisel is held nearly parallel to its course, and the resulting concussion radiates out into the bony arch which spans the sinus, and is not expended upon the vessel and its contents. The amount of disturbance thus occasioned the vessel and its clot is not to be compared with that which follows the use of the rongeur, for as the blade of this instrument is placed between the sinus and its overlying groove, the vessel is continually depressed and squeezed, and its contents are subjected with each bite of the forceps to considerable sudden manipulation. Should the thrombus be in a condition of disintegration, or should it be a partial clot, the danger of distributing septic emboli should not be considered as remote.

The rongeur as a desirable instrument with which to re-

move the overlying groove gains its safety in view of the fact that the broad beak of the instrument placed between the bone and the dura of the sinus depresses the vessel from its groove—safety gained at the expense of manipulation. In an uninvolved sinus this fact need not be considered, but when this vessel has become the recipient of a septic clot (the physical condition of which we are not certain until we have opened the vein) the disadvantages of the rongeur are apparent. If after exposing the lowest accessible portion of the sinus the examination points to its non-involvement, by placing a small compression plug across the vein we lessen the danger of disseminating septic particles with the rongeur. If it is evident that the vein is thrombosed at this point, or that the thrombus is in a condition of disintegration, we should resort to a jugular resection without making further attempt to uncover the sinus. If we are uncertain of thrombosis at this point, the compression plug should not be placed, but we should proceed to uncover the sinus throughout its entire area of involvement.

In exposing the sinus we should remove all diseased bone. If the involved dura is not now encircled by a good border of healthy membrane, the removal of healthy bone overlying the diseased dura should be continued until a strip of healthy membrane completely surrounds the involved area. If sufficient room for free manipulation is not now secured the sinus groove is removed until the requisite space is obtained.

It is difficult to state exactly the length of sinus which in all cases should be exposed, nor can we be governed by any arbitrary rule. The important indications to be met are:

1. Healthy sinus wall should be reached on both the torcular and bulb sides of the involved area. In some instances of extensive involvement the pachymeningitis extends so far down toward the bulb that we do not reach its lower limit.
2. The area of exposure should be sufficient not to hinder the manipulation.
3. It should embrace that portion of the sinus into which

empties the emissary vein, for this vessel may enter as a factor of error in judging the return flow.

4. In those instances in which the symptoms of sinus thrombosis are present, in which after opening the sinus we find it uninvolved and being unable to account upon other grounds for the symptoms present, we should expose sufficient of the sinus to allow the exploration of both the jugular bulb and the superior petrosal sinus. The amount of bone necessary to be removed for this is but slightly more than that which must be removed in order to obtain a free manipulation of the vein. It does not add to the gravity of the case, and the advantage to be gained in doubtful cases is supreme.

The Diagnosis of Thrombosis after Exposure of the Sinus.—While in many instances it is apparent that the vessel is invaded by a thrombus, experience has certainly taught us that the appearance and the "feel" of a sinus do not necessarily indicate what is within it.

When operating upon cases of mastoiditis in which symptoms of septic absorption pointing to sinus thrombosis are present, we will find it to be a conservative practice to open the vessel *regardless of its appearance, of its feel, or of its pulsation*; or again, if during the mastoid operation we expose a sinus which upon careful examination seems suspicious we should open the vessel *regardless of the lack of symptoms*. We have not sufficiently awakened to the insidious and formidable character of this disease, nor to the fact that in the earlier stages of sinus thrombosis the disease is silent and does not manifest itself through symptoms indicative of its presence, — chill, remitting temperature, and sweat, while not infrequently the earliest symptoms through which the disease announces its presence must, in the light of their pathological import, insomuch as they signify clot disintegration and not thrombus formation, be regarded as late manifestations proclaiming the advent of sepsis. Only by opening the sinus can we definitely acquaint ourselves with the conditions, and in this disease an error in diagnosis or a delay in operating too often means a fatality by leaving the question to chance.

If we follow this practice we will undoubtedly open many sinuses which are not invaded ; but, considering the number of vessels opened, ill results so seldom follow that this cannot be considered an accident, the gravity of which is often realized, unless the wound at the time of vessel injury harbors fluid pus or has not been cleansed. When proper cleansing has been instituted I have never seen an ill result follow from opening the vessel, and I have seen a sufficient number of sinuses opened under these conditions to feel confident that the danger is remote as compared to the danger which we incur by leaving these vessels which we suspect to contain thrombi unexplored. Unless we open these sinuses we will often leave thrombi within them, the presence of which we never know until the disease later announces itself through symptoms ; this then too often is too late.

When sinus thrombosis has passed into that stage where it manifests itself through symptoms indicative of sepsis it has then become formidable, and a large portion of these cases die regardless of surgical interference. It is imperative that we do not remain in doubt as to the vein's involvement. In the great majority of cases which the writer has observed it has not been known before opening the vessel whether a thrombus was or was not present. We have seen a sufficient number of fatalities follow the expectant plan, in which, though the sinus seemed suspicious, on examination the patient was returned to bed to await development, to feel that this represents a false and dangerous conservatism ; when the symptoms do appear they not infrequently are those of lepto-meningitis, the extension to the endocranial lymph sac having proceeded from the infective thrombophlebitis. Unless we open the vessel the following are errors which we cannot avoid :

1. An obstructing thrombus may exist in the lower inaccessible portion of the sigmoid or in the vicinity of the jugular bulb, and the sinus throughout its area of exposure may be absolutely non-indicative of the presence of thrombosis ; unless we open the vessel upon the symptoms we have no reliable means of determining the presence of the clot.

2. A parietal thrombus may be present which eludes detection. If granulations invest the vessel it is generally impossible to determine whether the resistance encountered upon palpation, and that which we attribute to a thrombus within, is due to a thrombus within or to the thickened vessel wall and the granulations without. A positive diagnosis of parietal thrombus is rarely made before the sinus is opened. If after a careful examination of the vessel (taking into consideration its appearance, feel, color, etc.) we are in doubt as to the presence of a thrombus the vein should be opened regardless of the lack of symptoms.

3. While it is true that a large portion of completely obstructive thrombi is easily recognized before opening the sinus, there are cases in which the thrombus completely blocks the vessel and yet escapes detection. Particularly is the diagnosis difficult if the external sinus wall is covered by thick exuberant granulations, as it frequently is, if the vessel wall be thickened by a long standing and slowly invading process, or the thrombus be of that liver-colored appearance and jelly-like consistency which represents a recent clot. These thrombi are often impossible to detect unless the vessel is opened, and I have repeatedly seen these cases pass unnoticed until the disintegration of the thrombus was later announced by symptoms. I have myself twice made the error in cases of completely obstructing thrombi in which there was an absence of symptoms—once with a fatal result. To claim that we can easily recognize a completely obstructing clot without opening the vessel is to claim what in a large portion of these cases we actually cannot do.

A difficulty in diagnosing the condition often is that a completely obstructing thrombus blocks a given portion of the sinus; from either the cardiac or torcular end of the obstructing clot there extends for a variable distance up or down a partially obstructive clot, and this parietal thrombus in turn gradually passes into a portion of the vessel which is absolutely patent and unobstructed; there may be no sharp jump from completely obstructing thrombus to normal unobstructed vessel, and a comparison between any two consecutive portions of the vein may offer no marked contrast.

If, in addition, the parietal wall of the vein is covered by an uneven layer of exuberant granulations, the problem of definitely determining the presence or absence of a thrombus is beyond our diagnostic ability. While the obstructing thrombus may occupy only a small portion of the vessel, the partial thrombus may involve the entire length of the remaining lateral or sigmoid sinus, and it may be here added that these incompletely obstructive thrombi constitute one of the most dangerous class of cases.

While the appearance and the feel of a sinus frequently give positive evidence as to the presence of a thrombus, they not only are often valueless in bringing us to a definite conclusion as to the vein's involvement, but are altogether misleading. There are some who lay such stress upon the discoloration of the sinus as to look upon it as an index of the condition within the vein, but of all factors that are of diagnostic value, this one taken by itself is the most fickle. When we consider the pathology of sinus discoloration we are forced to admit that the factors responsible for it need have no influence upon nor relation to the condition of the vein's interior, and such unbounded confidence in this one sign as we sometimes hear expressed is not well founded. Pulsation of the vessel or the absence of pulsation is of little value in diagnosis. As a diagnostic instrument, an aspirating needle is worse than useless; not only is it untrustworthy but it is dangerous.

An experiment which may be of some value in certain cases in determining the presence of a thrombus in the vicinity of the bulb prior to opening the vein has been brought forward by Whiting, of this city, and later by Meier, of Germany, and designated by the former author the "expression experiment." It is thus described: "The index finger is placed across the sinus at the bulb with sufficient firmness to cause obstructive pressure of the walls at this point. The other index finger is then placed close beside the first and, with a stroking, stripping movement, carried steadily along the course of the sinus toward the torcular as far as the knee, at which point the finger rests with firm pressure. An assistant now makes firm

pressure upon the jugular vein low down in the neck, so that the backward pressure of the blood current toward the bulb may be as much as possible augmented. It is now obvious that in case no obstructing thrombus existed in the vein or sinus the collapsed walls of the latter would be immediately distended with blood upon removing the pressure of either finger."

While in certain instances this procedure may assist in deciding the diagnosis for us, I feel that we should not rely upon any measure short of opening the vessel when we are in doubt as to its involvement; for when we come to a consideration of the anatomy of the region of the jugular bulb we find that the factors which invalidate this experiment (intended as it is to detect a thrombus in or below the jugular bulb) are numerous.

1. In the case of incompletely obstructing thrombi, as has been stated, the experiment is inapplicable; at the same time we may gain nothing from a diagnostic point by opening the vein; the thrombus may not be sufficiently large to noticeably affect the volume of the return current. I think, however, we place ourselves in a more certain position to judge of the vessel's patency by opening it, for as the degree of obstruction increases it will manifest itself sooner by a visible decrease in the return flow than by any noticeable failure to fill an unopened vein. If the vessel is covered by granulations and has become thickened it tends to maintain its patency as the fingers in this experiment become separated, and as the gush of blood refills the lumen, the thickened, non-resilient parietal wall does not belly out with sufficient suddenness, nor to a sufficient extent, for us to notice the occurrence of the phenomenon; it fills as a rigid tube, expressionless.

2. If a thrombus is below the jugular bulb, blocking the upper portion of the jugular vein, no matter whether the thrombus be partially or completely obstructive, a return flow from the inferior petrosal sinus and the other vessels tributary to the bulb would quickly fill the collapsed sinus and mislead us. For when the jugular vein is thrombosed, or ligated, the current in the inferior petrosal sinus (pro-

vided the bulb be also not occluded) sweeps across that reservoir, is merely diverted from its usual course, and finds exit through the posterior condylar and other tributary vessels to the bulb; if the sigmoid sinus be emptied, as in the above experiment, it, too, would soon be filled upon the release of pressure.

The posterior condylar vein, a vessel of considerable size, offers the same difficulties as does the inferior petrosal, and even though the jugular vein be blocked and the jugular bulb be blocked also, it is necessary, before the posterior condylar be eliminated as a factor of error, that the clot should extend out into the horizontal limb of the sinus beyond the mouth of this vessel.

There is another factor which enters as a source of error. The mastoid emissary vein joins the sigmoid sinus at a point which is between the points of compression. This vein varies considerably in size and not infrequently is of good calibre. It might be supposed that little bleeding would occur from this vessel into the main sinus or that the current in the emissary might be reversed under the conditions of thrombosis. We should remember, however, that the currents in veins which lack valves are only constant in direction in that they seek the path of least resistance, and that at any time these currents may reverse themselves under the conditions of disturbed circulation. As the finger strips the main sinus toward the knee it leaves behind it as it advances a vacuum of gradually increasing size, and the moment the finger passes the mouth of the emissary, the flow within the latter vessel is poured into the sinus, or if the current be from the main sinus it immediately reverses itself in order to follow the path of least resistance, which is into the vacuum.

If a clot completely blocks the lower portion of the vertical sinus limb, as the upper finger passes the mouth of the emissary the reversal of the current in this vein will continue until the main sinus has ceased to be the path of least resistance—*i. e.*, until the sigmoid has been filled, when the current in the emissary may again reverse itself. I have repeatedly seen a sufficient bleeding from an emissary vein into

a main sinus after the latter had been opened to be at first mistaken for a return flow coming from either above or below, supposedly due to an incomplete obliteration of the main sinus by the compression plugs; an amount of bleeding which would quickly have filled the sinus in this experiment and misled us. When we attempt this experiment we should eliminate the emissary as a factor of error. It is difficult to see how this procedure is applicable to those cases in which the thrombus is below the mouth of the posterior condylar vein.

If a thrombus is confined to the upper portion of the jugular vein and the bulb itself is uninvolved, we have no means of determining the presence of such a clot; nor would opening the sinus necessarily assist us in diagnosing this condition. The following case reported by the writer will illustrate the difficulty. We open a sinus and find a thrombus extending down into the bulb. Without disturbing this clot we expose the jugular in the neck, find its upper end completely thrombosed by extension of the clot from the sigmoid downward, and exsect the vessel. We now return to the sigmoid sinus and remove the thrombus from its bulb end, when we immediately get a copious return flow, evidently from the vessels tributary to the bulb (New York Academy of Medicine, February 9, 1905).

Had, in this case, the thrombus been confined to the jugular vein and had the bulb and the sigmoid been uninvolved, upon opening the sigmoid a copious gush would have come forth from its bulb end, and we might have inferred, but erroneously, that the jugular vein was free.

Method of Exploring the Sinus after its Exposure.—The sinus is frequently opened and explored in a manner which renders impossible the detection of a partial clot and prevents us in the case of either a partially or completely obstructive thrombus from determining the upper or lower limit of the invasion. This faulty method of procedure is one which is commonly practised; it is as follows: The flow from both above and below is blocked by the compression plugs placed on the torcular and bulb sides of the supposedly involved area. An opening is now made in the

external wall of the sinus for the introduction and manipulation of a curette. The instrument is passed into the lumen of the vessel first up toward the torcular and this end is curetted; pressure is now released on the torcular side to see if the flow from this end is copious, and if so compression is made, the upper end of the sinus is obliterated, and the hemorrhage is controlled. The curette is now introduced down toward the jugular bulb, and after a sufficient curetting of this end of the sinus pressure is released from below, and if the return flow seems sufficient compression is made and the hemorrhage from below is controlled.

It requires only a brief consideration of the pathology of sinus thrombosis and the evidence to be found upon post-mortem, to see that the above procedure is not only unthorough, but it frequently places the operator in doubt as to whether a thrombus has or has not been present—it generally leaves him uncertain as to whether the clot has been completely extruded, and the great danger of the practice lies in the fact that it does not reckon with the infected vessel as well as with the clot.

Some objections to this procedure are the following:

1. It is difficult to thoroughly curette through a small opening the interior of a blind tube, or to be certain that we have done so. If the thrombus be firmly attached to the interior of the vessel, we may fail to remove it completely; it may escape the curette, and as pressure is released the return flow may not be sufficient to detach it.

2. If the thrombus be not greatly obstructive, *i.e.*, if it be a partial thrombus, as pressure is released from either the torcular or the bulb end, the return flow which results will practically be as copious as if no thrombus were present. In other words, the freedom of a return flow does not necessarily indicate the absence of a thrombus; only when the thrombus is greatly obstructive does it diminish the return flow sufficiently for us to notice the diminution, and we can easily convince ourselves of this when having accidentally injured a normal sinus we take the trouble to obliterate its lumen by pressure gradually increased.

As the curetting is completed at the respective ends, the

instrument is withdrawn, the gush of blood occurs, we not infrequently fail to observe a clot, and we are completely at sea to know whether a thrombus has or has not been present.

3. Unless we slit the vessel freely open throughout the entire area of involvement and examine the interior of the vein, we never know that we have reached the limits of the thrombotic invasion; for while the compression plugs may have been placed at what appear to be the upper and lower limits of the vessel involvement externally, the interior of the vein may be invaded far beyond these points and a thrombus may extend beyond the compression plugs either out toward the torcular or down toward the bulb, and yet the external wall of the sinus over these areas does not indicate such extensive involvement and may appear normal in all respects. If now we curette up or down to the compression plugs and exsect that portion of the external vessel wall included between these plugs, and if the thrombi beyond these points are partial and do not greatly obstruct the vessel's lumen, we get a generous volume of blood from both the torcular and bulb ends upon the release of pressure and make the fatal error of leaving a portion of the thrombus still within the vein.

On more than one occasion I have seen a sinus opened for the introduction and manipulation of a curette, a thrombus removed, the compression plugs successively released from above and below, a good return flow from either end secured, and the intervening vessel wall exsected; the patient returned to bed, the symptoms continue, and in a few days later a second and more extensive operation done, in which the external wall of the sinus was now slit freely open both above and below so that the actual conditions within the vein could be seen; a second thrombus removed from beyond the site of the compression plug, and the firmness and consistency of which made it absolutely certain that this second clot was a portion of the first which had not been reached at the original operation, owing to the fact that the attempt had been made to carry out a manipulation through an insufficient opening, and that a return flow had been

accepted as a guaranty that the clot had been completely extruded, and that the limits of the thrombosis had been passed.

4. We may completely remove a thrombus, but if the clot has been firmly attached to the interior of the vessel, the vessel will have lost its intima, and the vein at this point will be infected; the vessel should be regarded as an infected tube and slit freely open throughout the entire area of involvement, *i. e.*, treated as an abscess cavity regardless of whether the thrombus is partial or complete, large or small, loosely attached or firmly adherent.

5. When only a sufficient opening in the vessel is made to allow the introduction and manipulation of a curette, and the vessel is not slit widely open throughout the entire length of involvement so that we can see the condition of its interior, any fistulous tract leading into the subdural space or into the brain must necessarily be overlooked unless by chance its point of communication with the sinus falls opposite the small opening that we have made in the external vessel wall.

6. If, after making only a small opening in the vessel and curetting its interior, we release the pressure, we will say from the torcular end, and get a return flow from above, we should remember that this flow may come from either a full-sized emissary vein, or from the superior petrosal sinus, or from both, and that the main sinus may be either partly or completely blocked above the openings of these vessels. Under these conditions the return flow may not be as free as a normal flow, but in the actual operation as we witness it we find that operators vary greatly in their opinion as to what constitutes either a sufficient flow or a normal flow. It might on first thought be supposed that the emissary vein would cause but little bleeding into the main sinus, but this emissary varies considerably in size, and not infrequently bleeds freely into the sigmoid.

We can only avoid these errors by discarding the above technique, dispensing with the curette, treating the condition as we would an abscess cavity, *i. e.*, slitting the external sinus wall and *exsecting it throughout the entire extent of*

thrombotic involvement (not merely to that point where we get a free return flow), and abandoning the idea that a return flow is a guaranty that no thrombus exists, or, having existed, that it has been completely extruded, and that the limits of thrombosis have been passed. We should rely not solely upon the return flow, but also upon an examination of the interior of the vein to determine the limits of thrombosis.

It has been advocated that our method of procedure in these cases should depend upon whether the thrombus is a partial or a complete thrombus, and to some extent upon its location. But to have these various points determined for us prior to opening the vein, while it serves to help in our description of the procedures, is largely theoretical. In the majority of cases we must approach these sinuses in ignorance of the conditions within them, and our method of procedure cannot be based upon a preconceived knowledge of the facts. While in many instances after the exposure of a sinus it is perfectly apparent that a thrombus completely obstructs the vessel, and in others it is equally certain that if a thrombus is present it is only partially obstructive, there is a large portion of these cases in which we are not only unable to tell whether the thrombus is partial or complete, but we are actually in doubt before opening the vein as to whether a thrombus does or does not exist; more than that, those doubtful cases are numerically not in the minority. If we have followed the usual technique and are honest with ourselves, and have made an opening in the sinus through which to allow the introduction and manipulation of a curette, we will in many instances be equally as ignorant of these various points after opening the vessel as we were before.

Could we determine that the thrombus did not invade the bulb or was confined to the vertical sinus limb, no matter whether the clot were partial or complete, a compression plug should be placed first below on the bulb side of the involved area, a second compression plug above, *i. e.*, on the torcular side of the involved area (unnecessary in complete obstruction), the external sinus wall grasped with forceps, lifted, and incised. If bleeding occurs it either comes from

incomplete obliteration of the main sinus by the compression plugs, or from an emissary vein provided the upper plug were below the point of entrance of the superior petrosal into the sigmoid; these factors of error can be easily eliminated. With a pair of scissors the external wall of the upper portion of the sinus is now slit up toward the knee, the interior of the vessel examined, and, having passed the upper limit of thrombotic involvement and reached the healthy vessel wall, the compression plug on the torcular side may be released, when a free return flow will occur.

The lower portion of the sinus is treated in a similar manner, after which the entire parietal wall of that portion of the sinus which is diseased is cut away; a curette should not be introduced. The compression plugs should be tucked between the sinus and its superimposed bony groove. The vessel is obliterated by the intracranial pressure forcing the sinus against the firm support offered by the plug and the overlying skull.

(a) When, however, we have to deal with sinuses in which we are uncertain of these conditions, our procedures must vary; these constitute the majority of cases. From a practical standpoint the important factor to be determined is, not whether the thrombus is a partial or a complete clot, but whether the clot is localized above the bulb or extends into it, *i. e.*, we wish to determine whether or not we can with safety produce pressure over the sinus by the gauze plug. If the sinus be involved in either complete or partial thrombosis, firm pressure over the vessel is by all means to be avoided; by compressing the parietal against the visceral wall, we may so mash the contained clot as to force a portion of it or discharge loosely clinging particles into the general circulation.

In handling this class of cases we should gently palpate the vessel and determine if possible by this means if there is any point along its course which seems the most likely to be involved; otherwise we select that point in the suspicious area most convenient to us. A small cylinder of gauze is now placed across the bulb end of the sinus, but the vessel is *not* compressed, and a second cylinder of gauze similarly

placed on the torcular side of the point which has been selected for opening the sinus and at a convenient distance from it. An opening is now made in the external vessel wall. Should free bleeding occur, the operator compresses the plug on the torcular side and blocks the return flow from above. If the bleeding is still free, the assistant quickly blocks the return flow from below by compressing the lower plug. If bleeding continues, we should remember that the emissary vein may be responsible, and consequently this vessel should previously have been exposed.

By getting a return flow from below, *before we exert pressure over the bulb end of the sinus* we minimize our chances of producing unnecessary pressure upon a vessel which is thrombosed, and therefore of discharging emboli into the general circulation. By opening the sinus *before producing pressure upon the torcular side* of the point of incision, we create an avenue of exit for any portion of a clot which, by our manipulation, may be set loose.

With the compression plugs in place the opening in the vein may be enlarged with the scissors and its interior carefully inspected. Should we find the sinus negative, we may proceed to investigate the region of the bulb and the superior petrosal sinus.

(b) If we have reason to fear a small parietal thrombus in the region of the bulb, not sufficiently obstructive to noticeably diminish the return flow from below, we may proceed in the following manner. A bent curette is introduced into the sinus at the site of the lower compression plug. An assistant now makes firm pressure over both internal jugulars (low down in the neck). The lower gauze plug is now removed, and such curetting as can be done is rapidly accomplished, in the hope that the thrombus, if such exists, has been dislodged. The curette is quickly withdrawn and the hemorrhage controlled by the lower compression plug, after which pressure in the neck is released. By producing pressure over both internal jugulars we eliminate to a great extent the aspiratory influence of inspiration, lessening thereby the chances of emboli passing into the general system. At the same time the backward flow through the

sinus wound is materially increased, giving the septic particles, if such are present, a better opportunity to be extruded. If we could determine that a clot were within the bulb, no attempt should be made to dislodge it prior to a jugular resection, but the above procedure refers to those cases in which the presence of a clot within the bulb is problematical and in which the evidence is not sufficient for a jugular resection; we see such cases.

(c) When the symptoms of sinus thrombosis are present, this does not necessarily mean that the sigmoid sinus is the vessel involved, although from the extension of otitic disease it is the sinus which most commonly suffers. The sigmoid may be perfectly normal in all respects, and if, after opening this vessel, we find it negative, we should remember the possibility of superior petrosal sinus involvement, and the close anatomical connection between this sinus and the field of original infection. We should remove the overlying sigmoid-sinus groove up to and slightly beyond the knee, block the flow from the torcular end, and test the patency of the superior petrosal. We should eliminate every possible source of error, for we are face to face with one of the most formidable complications of otitic disease, a successful issue from which depends upon early recognition and prompt surgical interference. When testing the superior petrosal, the emissary vein should be obliterated, as it may enter as a factor of error in judging the return flow.

(d) If after opening the vein we get but little bleeding, we have opened a vessel which is involved in partial thrombosis. If the bleeding is not sufficient to be annoying, no compression need be made, or the upper end of the sinus may be obliterated if desired. With the scissors, the lower end of the sinus is slit freely open, and as the incision is carried down into the healthy vessel wall toward the bulb and the lower limit of thrombosis passed, a free gush of blood will occur, after which compression is made. The upper end of the sinus may later be slit open with scissors, the incision passing outward until the upper limit of the thrombotic process has been reached, when compression may be

made to control the hemorrhage from the torcular end. The diseased parietal wall of the vein is removed with scissors, and the interior of the vessel is inspected.

If, after getting a free return flow from either side and placing the compression plug, we find, upon examination, the vein involved at that point, we should continue to remove the overlying sinus groove, should place a second compression plug on the distal side of the first, remove the first plug, slit the wall of the vein up to the distal plug, and so on, until the upper and lower limits of invasion have been passed.

(e) If after opening the sinus we get no return flow the vessel is occluded by an obstructive clot or is collapsed. We select the upper end of the vein and with scissors slit its external wall up toward the knee and if necessary out on the lateral sinus, until the incision has passed the upper limit of thrombotic involvement, when a free return flow from the torcular end will occur. Compression is now made.

We should not introduce a curette and attempt to dislodge the thrombus from the distal end, for we are dealing not only with an infective thrombus but with an infected vessel also, and this septic tube must be freely opened beyond the limit of its invasion, otherwise we leave behind the essential factors for a reinfection. The infected wall collapses and is held in contact with the visceral wall by the compression plug; this blocks drainage from the infected tube, a focus from which meningitis may proceed. The frequency with which a meningitis is grafted upon a sinus thrombosis should make us consider the manner in which the extension occurs. I do not hold the belief that a copious return flow is a guaranty of safety under these conditions, for this attitude ignores the infected vessel as a factor; in relation to the thrombus it is its cause. The failure to slit this infected tube wide open and to exsect it, but merely to curette its interior sufficiently to establish a return flow, is not only an unsurgical practice but, owing to the proximity of the endocranial lymph sac, an extremely dangerous one.

The lower portion of the sinus is treated in a similar manner, and if the lower limit of thrombosis is passed by the incision and the clot does not extend into the bulb, the free return flow from the bulb end of the sinus is permanently controlled. The diseased parietal wall of the vein included between the two compression plugs is now removed.

In opening the sinus great care should be taken to avoid cutting through the visceral wall. This is not an altogether uncommon accident and is a particularly unfortunate one in the young. We not only open the subdural space and invite infection, but in children whose intracranial pressure is subject to sudden increase, as during the act of crying, the danger of cerebral hernia is not remote. I have twice seen this complication arise from just this accident, both cases terminating fatally.

Indications for Jugular Resection.—If after the vessel has been slit freely open as far down toward the bulb as the bone removal permits, and we get no spontaneous return flow or an insufficient flow from below, and are unable to pass the lower limit of thrombosis, we should immediately proceed with a jugular resection and should make no attempt to curette the thrombus from the bulb before the removal of the vein. The attempt to curette a thrombus from the jugular bulb prior to jugular resection is so generally advocated, and the dangers attending this procedure are so numerous that they should be urged against it. For this reason the writer will go to some length to condemn a practice, which he feels has been responsible for many deaths.

¹(1) A dissection of the region of the jugular bulb at once convinces us that the mechanical obstacles to be overcome in an effort to curette this region are always great, more often insuperable, and that we do not generally curette beyond the horizontal limb of the sigmoid sinus.

First, if a straight instrument be used it is necessary that the curetting be accomplished around a double curve, the first curve resulting from the passing of the vertical into the

¹ The following portion of this paper was read before the Otological Section of the New York Academy of Medicine, April 13, 1905, under the title "The Danger of Attempting to Curette a Thrombus from the Jugular Bulb Prior to Jugular Resection." The date is mentioned as a matter of record.

horizontal sinus limb, the second from the sharp turn by which the horizontal limb of the sinus ascends and crooks over into the jugular bulb. Even if we remove the bony groove overlying the entire vertical sinus limb the soft tissues prevent a straight curette being depressed so as to be introduced along the axis of the horizontal limb and consequently offer an equivalent mechanical difficulty.

Second, if the instrument be curved so as to be introduced into the bulb any attempt to rotate the curette causes its end to impinge against the sides of the jugular bulb and meets with failure, for the end of the curved instrument describes in its rotation the arc of a circle having a greater diameter than the longest axis of the bulb.

Third, the partition separating the anterior from the posterior jugular compartment forbids our curetting but a portion of the bulb.

Fourth, the dome of the jugular bulb rises as a rule to such height that it luckily is placed beyond manipulative interference, and its contour prevents its being curetted.

Fifth, when hemorrhage occurs it usually is so copious that we must desist from curetting in order to control it, and we are not given sufficient time to carry out the manipulation with a degree of thoroughness which entitles us to dignify our effort by such a term. The bleeding flushes out only such portions of the clot as are loosely adherent.

On numerous occasions in the post-mortem room, with the jugular bulb exposed to direct view, I have made the attempt to curette this region and with the advantage of a larger mastoid exposure than is generally seen in the living subject; I am firmly convinced that the statement so often made that we curette the jugular bulb more frequently represents a license of expression than it does a fact.

(2) Granted that we can introduce a curette into the jugular bulb we turn to the post-mortem evidence and find that the mural implantations of septic matter are frequently so tenaciously fixed to the interior of the vessel that it is extremely difficult to remove these septic masses, even with the vessel opened and exposed to direct view, much less through a blind and tortuous channel.

These thrombi are often friable and the particles composing them show less tendency to cohere than to stick to the interior of the vein. To this latter structure they are intimately adherent, and we often are unable to observe a line of demarcation between thrombus and vessel wall. While the major portion of a thrombus may be broken down and either extruded or aspirated, the interior of the vessel may still be plastered with septic matter which the force of a return flow from the veins tributary to the bulb is not sufficient to detach. Under the influence of bacteria these septic particles clinging to the vessel wall later become broken down into an infective fluid which mingles with the blood stream, and it is this residue which causes the continuance of symptoms after a return flow from the bulb has been secured.

(3) Even though we could completely remove the thrombus from the bulb, we turn to the pathological evidence and find unfortunately that infective sinus thrombosis represents something more than is suggested by that term and in addition we are dealing with an infective pachymeningitis. The thrombus, so to speak, is the effect of which the cause is the infected dura of the vessel wall, and from a surgical standpoint the infected vessel is no less formidable than the clot. Though the clot may be removed, the infected vessel—the cause—remains, and being partly incollapsible the bulb being totally so, the space previously occupied by the thrombus now becomes partly filled with transuded serum and blood clot, and this in turn becomes infected through contact with the septic tube containing it. Later, under the influence of bacteria this coagulum undergoes disintegration and is distributed through the open avenue of the jugular.

In following the post-operative course of these cases I have been struck by the frequency with which the following phenomena may be observed. After passing a curette down toward the bulb and establishing a return flow from below which we regard as copious and sufficient, the symptoms which called for operative interference now abate; a fact showing that the process at the time is largely local, that

the factor giving rise to these symptoms has largely (or at least temporarily) been eliminated. A few days later, however, just about such time as we would expect the transuded serum and blood clot, or the remaining particles which still cling to the interior of the vein, to have undergone disintegration, there is an increasing tendency to an exacerbation of the fever; temperature fluctuations assert themselves, chills supervene, and we now perform a jugular resection but it is of no avail; the opportunity has been lost, and during this fatal interim of delay the case has slipped into the relentless grip of general sepsis.

(4) After opening a sinus we occasionally find its contained clot to be a recent one and but loosely attached to the interior of the vein. When such a thrombus extends into the jugular bulb we may grasp the clot with forceps and extract it, but the danger of this procedure is well illustrated in a case which I reported February 9, 1905, at the New York Academy of Medicine. We not only are uncertain that the entire thrombus has been extracted, but if the clot is broken off below the mouth of the posterior condylar vein, or well down into the bulb, we may get a return flow from the inferior petrosal and the tributary vessels to the region, which leads us to the false conclusion that the entire thrombus has been eliminated, whereas a portion of the clot may still remain in the upper end of the jugular vein; not only this, but the vein may also be infected. We cannot regard a copious return flow from the region of the bulb as a guaranty of safety under these conditions, nor accept it as evidence that the entire clot has been extracted, nor that the jugular vein is free, for this return flow represents the diverted currents of the tributaries to the bulb, and not regurgitated blood from the jugular vein itself.

An interesting question comes up in this connection. In those cases in which the bulb end of the sinus is thrombosed and in which with a curette the thrombus is broken down and a return flow from below established (prior to jugular resection), what portion of this return blood flow comes from the jugular vein? I am inclined to believe that the quantity of blood which comes from the vein itself is rela-

tively small in amount, and that the common idea that the main return flow is from this source is erroneous. For, as we expose the jugular in the neck, we are at once struck by the manner in which this great vessel (influenced by respiration) gulps down the blood that is fed into it. As inspiration occurs the tenuity of the vessel wall allows of an almost complete collapse of the vein, the effect being the equivalent of a valve action, while during expiration the damming up from above tends to block any regurgitation. Even though the latter influence be in great part eliminated, there is still little tendency to regurgitate, as is shown when the main vessel is ligated. While that portion of the vein above the ligature becomes bellied out and worm-like from overdistention, the portion of the vein below the ligature remains almost collapsed, even during expiration, and shows little tendency to fill. Again, if we open an uninvolved sigmoid sinus and, testing the return flow from its bulb end, find it normal, then produce pressure in the neck (low down) over the corresponding internal jugular vein, the return flow from the bulb, which at first we considered normal, now becomes greatly increased in quantity. The increment by which the original return flow is increased represents a quantity of blood which suffered an actual reversal along the avenue of the jugular. As there is such a marked difference in the volumes of the return flows under these two conditions, it becomes questionable if with the jugular uncompressed any considerable quantity of blood is regurgitated from that vein.

Again, if we produce pressure high up in the neck over the course of the internal jugular vein, a procedure which has been advocated to check hemorrhage from the bulb end of an opened sigmoid sinus, evidently upon the assumption that this return flow represents blood regurgitated from the jugular, we not only will fail to check this hemorrhage, but we will actually increase it, a procedure which shows conclusively that the return flow from the bulb end of the sinus is not from the jugular vein itself, but represents the currents from the tributaries to the bulb which, having their usual avenue of egress blocked, are now diverted. When we,

therefore, get a return flow from the bulb end of the sigmoid sinus after the removal of a clot, we should be wary of interpreting this phenomenon as being of definite import, or of concluding that this return flow comes from the jugular vein itself, and can therefore be regarded as evidence of the patency of that vessel or of its non-involvement.

This point has a vital bearing upon the technique of the operation; it illustrates the danger of assuming that we are safe when, having removed a thrombus from the vicinity of the bulb prior to ligation, we get a free return flow from below; it argues jugular resection prior to an attempt to break down a thrombus in the lower inaccessible portion of the sigmoid or in the vicinity of the bulb.

(5) In breaking down a thrombus in the region of the bulb, the broken-down particles will be of various sizes, some of which will in all probability be too large to flush between the instrument and the vessel wall. For all these emboli to be flushed out through the sinus wound, they must be carried in the contrary direction to the natural current, must be flushed backward against gravity and against the varying curves of the sigmoid sinus, which act sometimes in the manner of a valve. At the same time the curette introduced within the lumen of the sinus considerably blocks the egress of the particles; the instrument will remain within the vessel for several seconds, while the manipulation is being carried out, during which time several inspirations will inevitably occur. Each of these almost completely empties the jugular vein. As this vessel refills, it draws its chief supply from the pool of blood within the jugular bulb; if now by instrumentation we have suspended infective particles in this reservoir, we have sown the seed for general sepsis, we have brought a local process to the verge of a general condition, over which human effort has little influence or control. An inspiration may be all that is needed to generalize the sepsis. At this moment we shift the responsibility to chance. If the clot within the bulb is non-infective, and occasionally it is (but experience has taught us that we do not know this at the time of operation and have no right to assume it), and it merely repre-

sents a protective barrier to the further invasion of the septic process, we expect no evil results other than those arising from the plugging of vessels by non-infective emboli; dependent upon the sites at which the arrests are made may we or may we not have trouble.

In this connection I mention a phenomenon which I have frequently observed after an attempt has been made to dislodge and break down a thrombus in the vicinity of the bulb, prior to jugular resection. We find that the patient complains, subsequent to the operation, of shifting pains, pains in or about the joints, in the chest, or elsewhere, which soon subside, only to appear in some distant locality. We apprehend metastases, but no abscess formation follows, and the pains soon disappear. The relation between our operative procedure and this phenomenon of pain, which skips from point to point, seems so close that we are at least entitled to suspicion that responsibility for this pain is in the dissemination of emboli, the infectivity of which is not sufficient to cause local abscess formation, but which no less argues against the practice of breaking down a clot in the vicinity of the bulb before closing the great avenue of entrance to the general circulation.

When, however, our surgical attitude is based upon a chance guess that the thrombus within the bulb is non-infective, we sacrifice an unnecessarily large percentage of the cases. It is scarcely conservatism to suppose that a thrombus, arising from an infective process, is sterile; a portion of it may as yet be uninvaded, it may not be broken down, but its naked-eye appearance is no index of its infectivity, and it is in violation of pathological facts for us to assume that we can point out the line of demarcation between infected and non-infected clot. I am aware that some operators, after making an attempt to curette the jugular bulb, and failing to get a return flow and consequently to dislodge the thrombus, leave it in the hope that the clot is not infected and do not proceed with a jugular resection, but return the patient to bed to await developments, and trust to the benevolence of chance. Considering the high mortality and the frequent metastases which follow this

procedure, the practice deserves mention only that it may be unqualifiedly condemned.

If for any reason, as through the intervention of shock, we are forced at the time to abandon the jugular operation, we may, before attempting to remove the thrombus from the bulb end of the sinus, resort to a procedure advocated by the writer, and which he believes to be of advantage in such cases. We institute pressure in the neck, low down, not only over the course of the internal jugular of the same side, but over both internal jugulars, the opposite jugular being compressed slightly prior to its fellow, by which procedure we eliminate to a great extent the aspiratory influence of inspiration (the most important factor in the dissemination of septic particles), and at the same time materially aid in flushing the suspended particles backward through the sinus wound (*American Journal of the Medical Sciences*, February, 1905).

(6) The aspiratory influence of inspiration is a most important factor in disseminating septic particles suspended in the pool of the jugular bulb, and this factor should never be disregarded. This in itself is sufficient to condemn any attempt to break down a thrombus in the region of the bulb before the great avenue of entrance to the general circulation has been closed to these infective emboli. Before an attempt is made to dislodge a thrombus from the bulb, the aspiratory influence should, as far as possible, be eliminated, and this is partly accomplished by a jugular resection—it is one of the great reasons for a jugular resection. Unfortunately too much credence has been placed in the claim that the intracranial venous sinuses enjoy an immunity to aspiration; they, without doubt, are protected from excessive aspiration, but by no means are they exempt. That this influence is not sufficient under normal conditions to convert the current in the sinus into an intermittent one and to register itself as a dimpling of the sinus wall during the inspiratory act we do not doubt, but this does not mean that the sinus contents are not aspirated. When the intravenous currents are disturbed, as in sigmoid-sinus thrombosis, we not infrequently witness the effect of inspiration

upon the sinus, demonstrating itself by the dimpling of its parietal wall during the inspiratory effort. That the aspiratory influence in the latter instance is increased there is no reason to believe; merely under the conditions of disturbed circulation does inspiration so succeed in registering itself that we may witness its effect upon the vessel as a naked-eye phenomenon. Under these conditions the danger of air embolism is greater only from the fact, however, that the lumen of the vessel is imperfectly filled by blood and a vacuum exists; not from the fact that the aspiratory influence is changed. Suspended septic particles set loose by the curette in the region of the jugular bulb will be subjected to the aspiratory influence, whether the external sinus wall has or has not dimpled during the effort of inspiration.

(7) There is another factor which plays an important part in the dissemination of suspended particles set loose in the region of the jugular bulb, and for the consideration of which it is necessary to somewhat diverge.

It has long since been pointed out that the blood stream in the inferior petrosal sinus is in all probability a particularly swift current, having a more rapid rate of flow than the current of the sigmoid sinus. In favor of this view has been mentioned the fact that the inferior petrosal is a straight sinus, and has a considerable fall from its source, the cavernous sinus, to its point of entrance into the jugular bulb; that between these two reservoirs the inferior petrosal enjoys a considerable declivity. The pulsation of the carotid artery transmitted to the cavernous sinus has also been mentioned as a factor tending to increase the rate of flow within the inferior petrosal, acting, as Macewen has ingeniously suggested, "like a hand pressing gently upon an india-rubber ball."

That the pulsation of the carotid increases the rate of the current in the inferior petrosal sinus, while representing an ingenious theory, I see no particular reason to believe. For, as an artery pulsates it straightens out in a direction from the heart—*i. e.*, in the direction of its own current, which is here in a contrary direction to the current in the inferior

petrosal sinus. The pulsation of the artery would consequently act as a retarding influence upon the flow within the sinus, as the tendency would be as the artery lengthens to milk the current of the cavernous and consequently that of the inferior petrosal forward—*i. e.*, in the contrary direction to its usual flow.

Regardless of the influence of the carotids upon the inferior petrosals, there still remains strong evidence in favor of the supposition that the currents within these vessels are particularly rapid.

In studying the relations of the inferior petrosal sinus, the factor which appeals to me as the most apparent and forceful argument in favor of a rapid flow within this vessel is, that the inferior petrosal is anatomically so placed that it is in a most advantageous position to be aspirated.

1. In direction it represents the continuation of the internal jugular vein, and the mouth of the sinus is aimed directly at the opening of the jugular, so that the inferior petrosal pours its blood stream directly at the orifice of that vessel.

2. Whatever the aspiratory influence may be, it proportionately is exerted to a greater extent upon the inferior petrosal sinus than upon the sigmoid; for the sigmoid is somewhat protected from aspiration by its varying curves, by its right-angled position to the jugular vein, and by reason of the fact that the jugular bulb is on a higher horizontal level than the horizontal limb of the sigmoid sinus, in consequence of which we have a goose-neck mechanism.

The arrangement of the inferior petrosal sinus, however, instead of suggesting a provision against aspiration, suggests the contrary. A short, wide, straight, and incompressible vessel on a higher level than the jugular bulb, with a sharp declivity, placed in direct line of aspiration and connected with the large venous reservoir, the cavernous sinus, would seem to suggest that the inferior petrosal enjoys the distinction of being a governor, through which the flow of blood in the intracranial venous sinuses is capable of being regulated through the mechanism of aspiration.

The arrangement of the inferior petrosal sinuses and their

relation to the jugular bulbs not only suggest the part played by these vessels in the hydraulics of the intracranial-sinus system, but the importance of the aspiratory influence of inspiration as the means whereby this is accomplished.

The swift current issuing from the mouth of the inferior petrosal as it traverses the pool of blood within the jugular bulb must create a suction which tends to drag in after it suspended particles set loose by instrumentation and to carry these emboli down through the avenue of the jugular into the general circulation for distribution.

(8) When the sigmoid sinus is thrombosed and blocked and fails to feed the jugular bulb with the quota of blood which under normal conditions it pours into that reservoir, the probabilities are that under these conditions the current in the inferior petrosal sinus is even more rapid than under ordinary conditions. For the aspiratory influence is a fairly constant factor, and is now expended not upon the sigmoid sinus, but upon the jugular bulb and its few remaining patulous tributaries, the inferior petrosal being a chief one. The reservoir of the bulb being insufficiently supplied by blood (insomuch as its main source of input, the sigmoid, is now blocked) becomes emptied or nearly so with each inspiratory effort, the result being that a vacuum is created in the bulb, in consequence of which the rush of blood along the inferior petrosal sinus and the other tributary vessels to the bulb is encouraged in order to overcome the vacuum. That such a vacuum does exist under these conditions we can easily convince ourselves when having exposed a normal sinus we institute the mechanical equivalent of a thrombus, *i. e.*, pressure with the finger upon the lower portion of the vertical sinus limb. As the obstructive pressure increases to that extent where the input from the torcular end of the vessel falls short of the quantity of blood which with each inspiration is withdrawn, the lower portion of the sinus immediately begins to aspirate. When, therefore, we attempt to curette a thrombus from the region of the bulb in the operation for infective sigmoid-sinus thrombosis, we are confronted by the hydraulic conditions which particularly predispose at this time to the passage of suspended particles

into the general circulation along the unobstructed avenue of the great vein in the neck.

Aspiration under the above conditions is notably to be well observed in children, for which reason in this class of cases it is particularly dangerous to attempt to break down a thrombus in the region of the bulb prior to jugular resection.

For the above reasons the attempt, which is so generally advocated, to break up a thrombus in the region of the bulb prior to jugular resection, in order to establish a return flow from below, I believe to be the most dangerous procedure ever advocated in the technique of the operation for infective sigmoid sinus thrombosis, and in a considerable number of cases I have watched this point with care. Of those cases which I have personally observed, in which after the external wall of the sinus has been freely opened, in which no spontaneous return flow comes from the bulb, and in which a curette is now introduced down toward this region, the clot broken up and a return flow secured, the major portion have died of the effects of sepsis. Of those that have recovered, the great majority have either developed metastases (which luckily failed to occur in some vital organ) or have later had the jugular removed.

The Question of Preliminary Jugular Ligation when Aspiration of the Sinus is Observed.—On exposing the sinus we occasionally notice a dimpling of its parietal wall during the inspiratory act. When aspiration of the sinus is observed, the important practical question immediately arises as to whether a jugular ligation should or should not be resorted to before opening the sinus, in order to eliminate as far as possible the danger of air embolism. Many operators answer this in the affirmative.

If we adopt this plan we will in many instances ligate jugulars which are in no way involved, and for no other purpose than to overcome a mechanical difficulty which it may be possible to solve by simpler means.

When the external wall of the sinus dimples it does not necessarily indicate the position of the clot; the obstruction may be on either the torcular or the bulb side of the point

which dimples, more probably on the torcular side. Moreover it does not indicate whether the thrombus is partial or complete; it may be either; it is necessary, however, that the clot be highly obstructive. When aspiration of the sinus is observed we should at once expose a considerable length of the vessel wall. A point is now selected on the torcular side of the point which dimples and by pressure with the finger the lumen of the sinus is obliterated. At the same time we notice whether or not this influences the aspiration of the vessel. If under these conditions the sinus dimples as before, the thrombus is on the torcular side of the dimpling-point. In carrying out this procedure attention should be paid to three factors.

1. The point at which pressure is made should be at sufficient distance from the point which dimples to prevent traction being transmitted along the external vessel wall to that point, and consequently affecting the phenomenon by stretching the vessel wall.

2. The emissary vein should be temporarily obliterated.

3. The point at which pressure is made upon the main sinus should be, if possible, below the point of entrance of the superior petrosal into the sigmoid.

The attempt should now be made to see if the vacuum can be overcome. To determine this we exert pressure in the neck (low down) over both internal jugulars, and lower the head. If, under these conditions the sinus fills and the dimpling disappears, we can proceed as under ordinary conditions of thrombosis, for the intravenous relations are temporarily restored. With pressure still continued we can with safety open the sinus, slit the external wall with scissors down towards the bulb as far as the vessel involvement may indicate, judge the copiousness of the return flow, and if this seems normal, and the lower limit of vessel involvement has been passed, a compression plug may be placed over the bulb end, and a jugular resection avoided. The external wall of the torcular end of the sinus may now be slit open, the incision being carried out into perfectly healthy vessel wall, beyond the limit of thrombosis, when compression is made.

To perform a jugular resection immediately upon observing aspiration of the sinus is a hasty procedure, *for aspiration may not only occur through the direct avenue of the jugular of the same side, but also through the indirect avenue of the opposite jugular*; I have twice seen this occur. It is extremely important, from a surgical standpoint, not to regard the intracranial venous sinuses as distinct vessels, but as portions of a common circuit. The greatest length attributable to any individual sinus, surgically speaking, should be that portion of the vessel included between the two nearest consecutive branches of sufficient size to transmit the influence of aspiration.

Exerting pressure low down in the neck over the course of the internal jugulars in such a procedure as the above is not an altogether unmixed good. There are some dangers which may arise from such a practice, but a careful consideration of these will show that these dangers are in no way to be avoided by a jugular resection; in fact are more imminent when a jugular resection is immediately resorted to, and a brief consideration of the hydraulics of the venous system will convince us of this fact.

When we exert pressure in the neck over an internal jugular vein, we cause a sudden blocking of the current, a damming back of the blood columns, a swelling of the tributary veins, a tendency to a reversal of their currents along the avenues of communication, at the same time to dislodge any loosened particles of a contained thrombus and to force these emboli into the general circulation along the paths of least resistance. We do the same thing when we immediately resort to a jugular ligation, with the difference that it is done very much more effectively.

When, however, both internal jugulars are simultaneously compressed, the few remaining avenues of entry into the general circulation become in their capacity for returning the great volume of cervical and cranial venous blood relatively small and incompetent for the task which has suddenly been imposed upon them, in consequence of which the blood columns in general do not so tend to reverse themselves along the avenues of communication with the

opposite side as they do to temporarily stagnate; as proof of which we note the tremendous congestion of the superficial veins under these conditions. If now with the blood columns in a condition of temporary retardation (during which time we can quickly determine whether or not the vacuum in the above experiment can be overcome) the sigmoid sinus be widely opened it immediately becomes the path of least resistance, and, moreover, this avenue of exit is in direct proximity to the involved area, under which circumstances the dislodged particles would have a better opportunity to be extruded.

When, on the other hand, we immediately resort to a jugular ligation upon observing aspiration of the sinus, any particles which should chance to be detached by the reversal of the blood currents would pass readily over into the circulation of the opposite side. As proof of this is the fact that when one jugular alone is compressed or ligated there is no noticeable congestion of the veins of the head, and this is what would naturally be expected, for the various communications existing between the branches of the two great jugular trees afford such ample opportunity for compensation to occur that these communicating branches show no visible taxation. If now the sigmoid sinus is unopened, the suspended particles having no avenue of exit are forced along the paths of least resistance into the general system through the unobstructed avenues of communication.

When only one jugular is blocked, either temporarily by the finger or permanently as by ligature, the tendency to a reversal of the blood currents along the avenues of communication with the opposite side is greater, and a tendency to a stagnation of these currents is less than when both jugulars are compressed. This is a point of considerable practical importance. No matter whether we resort immediately to a jugular resection upon observing aspiration of the sinus or attempt the above experiment, the patient is subjected to a certain risk; that is, such danger as arises from the reversed blood current dislodging loosened particles of a thrombus, and carrying these emboli into the general system. This risk, however, is the inevitable tribute which

the conditions impose upon the patient, and is not to be completely avoided by any measure that we may institute. Of what value the above procedure may be I do not know; in only one instance have I had an opportunity to try it, but in this case it rendered unnecessary the jugular operation.

Indications for Primary Jugular Resection.—The indications for a primary jugular resection are rare. (1) If in addition to symptoms pointing to sinus thrombosis we find along the course of the internal jugular induration, tenderness, and the cord-like swelling so frequently referred to in literature, primary removal of the vein is indicated. I have seen but one such case. We must differentiate this condition from Bezold's perforation complicating mastoid disease with symptoms of septic absorption.

(2) When in addition to symptoms pointing to sinus thrombosis we have the phenomenon of metastasis I would primarily resect the jugular vein. While we frequently see metastases follow operation (due in no small measure to the attempt to break down a thrombus in the region of the bulb prior to jugular resection), it is uncommon to see metastases antedate the operation. Of the forty-four cases observed by the writer, none has shown metastases prior to operation. The second indication is therefore comparatively rare.

Jugular Resection after Exposure of the Sinus but Prior to Opening it.—If after the exposure of a sinus it is evident that a thrombus extends down into an inaccessible portion of the sigmoid, or that the clot in the lower portion of the vessel is in a condition of disintegration, we should resect the jugular before manipulation or opening the sinus. We see few cases in which prior to opening the sinus we can determine the lower limit of thrombosis—in fact, are unable in the majority of cases at this time to definitely inform ourselves of the presence of a clot. If we rely upon our ability to diagnose the presence of a thrombus in the sinus or to determine its lower limit of invasion, and then proceed to resect the jugular before opening the sigmoid (a practice recently advocated), we will resect many normal jugulars; we will later

open many sinuses which will bleed copiously from their bulb ends and which are free from clot, or in which the clot does not extend into an inaccessible portion of the sigmoid or into the bulb, and in which a jugular resection is therefore unnecessary, and we not infrequently will remove jugulars from cases of meningitis, cases which we have erroneously diagnosed as sinus thrombosis, being misled by both the symptoms and the appearance of the vessel. Such a practice is an unnecessarily radical and dangerous procedure. Of the fifteen cases operated upon by the writer, in seven the thrombus was confined above the bulb and so located that the vessel could be opened well beyond the lower limit of invasion. These cases recovered without having their jugulars removed and without developing metastases. In searching the reports of the New York Eye and Ear Infirmary, it will be found that of sixty-one cases of sinus thrombosis the thrombus was located above the bulb in forty-six per cent.

Jugular Resection.—The operation of jugular resection is under certain conditions a most rational and beneficent procedure; it is a logical imitation of the process of thrombosis, the example set by nature in her effort to interpose a protective barrier between the invader and the invaded; it is the picture of defensive warfare.

This operation has never met with its just dues and from some sources has been severely condemned. The explanation is not far to seek and is to be found in the fact that the average jugular resection performed to-day is performed too late—after a sinus operation has proven to be inefficient—often at a time when the process has passed from a local into a general condition, a time when we may expect no surgical procedure to stay the progress of this fatal malady.

Before resorting to a jugular resection we naturally ask ourselves, What do we accomplish by this operation? As we generally consider it, the primary object of the jugular resection is to cut off the avenue by which septic emboli enter the general circulation, and to some extent this is accomplished. At the same time the influence of aspiration upon the broken-down particles which we dislodge is in

great part eliminated. The extensive character of the disease, however, as we see it in the post-mortem room, involving as it does not only the sinus and the jugular, but their tributaries, suggests that the operation of resection must, in order to succeed, accomplish more than the mere blocking of the main avenue of entrance, otherwise the recoveries would be fewer; for the tributary vessels to the sinus and the jugular, particularly the vessels tributary to the bulb, are vessels of considerable size and afford ample opportunity for infection to take place through their avenues; moreover, these avenues are not infrequently invaded. As we resect a jugular vein, in addition to blocking the main avenue of entrance to the circulation we cause a sudden tendency to stagnation in the multitudinous branches of the jugular tree and bulb, with the result that we take the primary step toward interposing between the area of infection and the general system numerous non-infective coaguli, which hem in the involved area and tend to localize it. For this reason we resect the jugular instead of ligating it, and remove the vein low down in the neck and not high up. Otherwise a collateral circulation may be established which will thwart this protective coagulation in the tributaries, which we desire. The importance of this is also suggested by the following clinical fact: in exposing the jugular in the neck we not infrequently find this vessel partly or completely collapsed. The vein may contain no clot and its walls may not be invaded, yet the mortality in these cases is exceptionally high, regardless of the jugular resection. The imperfectly filled condition of the vein points to the involvement not only of the main vessel, but to the involvement of its tributaries, and argues extensiveness—*i. e.*, invasion of the by-paths to the main sinus, avenues surgically inaccessible.

We now ligate the jugular vein, but we accomplish little, for its collapsed condition was the equivalent of a ligature, and by tying it we do not succeed by one iota in bringing about that protective coagulation in the tributaries on the cardiac side of the septic thrombi which occupy them. The jugular resection consequently fails in one of its most

important accomplishments for the reason that the disease has preceded us and interposed septic instead of sterile coaguli in the tributaries. The process may yet be local, but we are helpless to hem it in, to prevent its spread along the tributaries to the bulb, or in fact to influence it by tying the collapsed jugular of the involved side. We without doubt meet such cases, and in which we erroneously regard the septic process as having become generalized at the time of operation, for the reason that our surgical measures later prove inadequate, and the patient passes into general sepsis, or, as we suppose, continues in general sepsis. Unfortunately when we resect a jugular vein we do not succeed in bringing about a sudden coagulation in the jugular bulb or in the tributaries thereto unless the bulb and a good portion of these tributary vessels are already blocked by thrombi. To eliminate the currents in the bulb we must do something more than the jugular resection.

When the lower inaccessible portion of the sigmoid or the region of the bulb has become the recipient of a septic thrombus, the numerous avenues of communication between this region and the general circulation, along which infective emboli may be carried, constitute a disadvantage. For as the jugular is resected and as the clot is removed from the lower portion of the sinus, the current issuing from the inferior petrosal, if this vessel be not blocked, having its usual avenue of egress now cut off, fills the bulb, and as pressure within this cavity rises there is not only a tendency to a slow stagnation within the bulb, but also a tendency to a reversal of the blood currents of the lesser tributaries, along which avenues septic emboli may be swept into the general system. When, therefore, we attempt to break down a thrombus in the vicinity of the bulb, even after the jugular is resected, we are exposed to some risk from emboli. The danger of disseminating septic particles, however, is not so imminent as when the great avenue is open.

The complete and rapid obliteration of the bulb by a non-infected coagulum is surgically to be desired, for just in proportion as we can hem in and localize the infected area do we expect success. If we accomplish this, even though the

coagulum in the bulb later becomes infected and broken down through contact with an infected bed, we will have succeeded in bringing about a sterile thrombosis in the uninvolved tributaries to the bulb and in blocking these avenues of entry to the general system. In order to accomplish this we must eliminate the factors which tend to keep up the currents in the bulb after the jugular has been resected. The most responsible factor for this is a cross current established between the inferior petrosal sinus and the posterior condylar vein, or, in case the latter vessel is absent, through that tributary next in size to the inferior petrosal. While the jugular resection constitutes the chief and primary step toward this end, we ultimately accomplish our object (a sudden coagulation) only when we have introduced gauze into the bulb, or as far as the mouth of the posterior condylar. I consider this an essential step in the operation of sinus thrombosis when a return flow has been obtained after the removal of a thrombus from this portion of the vessel. It is altogether unnecessary to introduce gauze into the bulb end of the sinus for the purpose of controlling hemorrhage. To accomplish this we should tuck a cylinder of gauze between the sinus and its overlying skull, a most excellent practice first advocated, so far as I am aware, by Whiting. When we do not succeed in establishing a return flow from the bulb, the packing serves for such drainage as may be accomplished.

In these formidable cases of sinus thrombosis we should resect the jugular vein with the idea of bringing about just as extensive a coagulation in the branches of the jugular tree and bulb as is compatible with the least venous return flow which will insure against systemic disturbance arising from faulty venous return circulation; for we have no way of determining the limit of the infected area or the branches which are involved, and after a jugular has been removed and submitted for examination it is not uncommon to find branches, which at the time of operation were patulous and apparently normal, invaded and occupied by partial thrombi. I have repeatedly seen the main vein itself, which at the time of operation appeared normal, show upon ex-

amination extensive partial thrombosis. We cannot with the eye judge the extent of the vessel involvement, nor detect the lower limit of its bacterial invasion, for which reason it behooves us to ligate the vessel low down in the neck and not, as has been advocated, in the middle of its course. Equally to be condemned is the practice of ligating the vein below and above and allowing it to remain in the neck; by doing this we fail to bring about that protective coagulation in the involved tributaries. Currents continue to flow through this network of septic vessels, and we fail to interpose those protective barriers which it should be our endeavor to place between the involved tributaries and the general circulation.

The above practices carry with them no less a conviction than that their advocate has lost sight of the pathology of the disease and fails to appreciate the significance of this surgical procedure. It is also a fact that a non-infective thrombus or sterile coagulum may undergo disintegration and absorption, and that the vessel's patency may be restored. Though we temporarily produce an extensive obliteration of the jugular tree, this does not necessarily argue permanency, and without doubt a considerable portion of these occluded avenues will be restored to a useful function.

It occasionally so happens that we are given an opportunity during the operation to observe the manner in which the blood stream, influenced by respiratory action, brings about the dissolution of a thrombus and restores the vessel's patency.

When the thrombus extends down into the jugular, and as that partly filled vessel is exposed to view, we notice what appears to be a propulsion of the contained blood column against the cardiac end of the thrombus, and this in turn succeeded (during inspiration) by its withdrawal and the emptying of the jugular vein. It appears as if an air bubble were within the vessel running up and down. This alternate licking of the thrombus by the blood column and the "milking" of the vessel by the inspiratory act, plays an important part in restoring the patency of the veins and

has an important bearing upon the following clinical fact:

In delayed jugular operation it is not uncommon to find a portion of the vessel a purulent, infiltrated cord with its walls many times their normal thickness, with the endothelium gone, and which when cut across stands out as an open tube—*i. e.*, the most favorable conditions exist for thrombus to be present, yet the vessel contains neither blood nor clot. That the vessel did once contain a clot which under the above influence (plus that of bacterial activity) has been disintegrated, is highly probable and explains the almost uniform mortality in these cases, for the condition imposes that a large portion of the thrombus has already been distributed to the general circulation, and that consequently the disease is no longer local. Certainly the great majority of these cases die of sepsis, even though we succeed in ligating the vein at a point which appears to be below the limit of invasion.

It is not a little remarkable that after the complete obliteration of the internal jugular, the sigmoid and lateral sinuses of the involved side, no ill results follow which can be attributed to the disturbed circulation caused thereby.

In the first place, thrombosis takes place gradually and the element of time is given the remaining vessels to adapt themselves to the necessity of compensation. The numerous communications existing between the branches of the two great jugular trees and the connected system of sluiceways represented by the intracranial venous sinuses and the ease with which a vein meets the task of encompassing a larger volume than that to which it is ordinarily accustomed are factors which as a rule insure against this accident. In only two instances have I ever seen phenomena arise which might be attributed to embarrassed venous return due to ligation. The first was a case in which a complete thrombus extended from the torcular Herophili to the point of entrance of the facial into the jugular vein, and in which the lower portion of the jugular was partly filled. The vessel was ligated behind the sterno-clavicular joint, and about the fourth day following operation papillitis was noticed in the

eye of the corresponding side; papillitis had, however, existed in the opposite eye prior to the ligation, and it is doubtful if the jugular resection was responsible for the second papillitis. The second case was one in which after the ligation and resection of a jugular containing a generous volume of blood, and in which the remaining vessels had suddenly the task of compensation imposed upon them, there developed a sudden and transient mania. In no instance have I been able to observe an increased congestion of the retinal veins immediately after resection, nor has there been any observable difference between the vessels of the two eyes. I have watched for this in a large number of cases. In the case just mentioned, in which papillitis appeared, a second examination of the eye was not made until the fourth day following the jugular resection, at which time it was observed. In this instance congestion of the retinal veins might have been observed immediately after the resection, but this is problematical.

The ease and rapidity with which compensation occurs brings up the question of how far can we go in an effort to bring about an extensive thrombosis in order to isolate the infected area. For when the disease has invaded the tributary veins to the main vessels it has truly become formidable. We can no longer reach these individual avenues by direct surgical interference, and our only remaining chance at localizing the process is to imitate the example set by nature and to bring about an extensive protective thrombosis in the hope of causing these barriers to effectually block the invaders, or, failing in this, to so retard the progress of the invasion as to feed the system by a more graduated septic dosage, under which circumstance the human organism is given the better opportunity to fight its battle upon the basis of individual resistance and a possible partially acquired immunity.

There is sufficient evidence to arouse the suspicion that in a portion of those cases that die of gradual exhaustion, in which the post-mortem reveals no metastases and in which during life the blood proves bacteriologically negative to both microscopic and inoculative tests, the process remains

local until a very late period in the disease; that is, a true invasion of the blood by hordes of organisms in sufficient numbers to propagate themselves and to keep up symptoms without assistance of reinforcements from the original source of infection does not exist. In other words, could the original focus of infection be eliminated or hemmed in and localized, the septic dosage which at any given time is in circulation, no matter whether the septic dosage be small numbers of organisms or their toxins, could be successfully gotten rid of by the general system. Could we know the truth in these cases, could we determine with a fair degree of accuracy the time at which the process was passing from a local into a general infection, and having determined previously by experiment those vessels the obliteration of which would bring about the greatest tendency to hem in the involved area with the least disturbance to the return circulation, I would expect that we not infrequently would be entitled to a supreme effort at localization. I believe that along these lines further surgical progress is to be made in these very formidable cases. Success depends upon our ability to localize the disease and our various surgical measures are but means toward that end.

While no attempt will be made at a description of the jugular operation, there are some points concerning it which may be mentioned. In sterilizing the field of operation, inasmuch as we do not know the condition within the jugular (it may be occupied by a disintegrating thrombus), great care should be taken not to knead the neck. It is best to grasp the skin and lift it from the underlying tissues, and such scrubbing as is done should be without pressure.

In exposing the vein, it should be our endeavor to ligate it low down in the neck and as soon as possible. By ligating early we tend to block the avenue of entrance to particles which in the manipulation necessary to expose the vessel in its entire course may be set loose.

The branches as well as the main trunk of the jugular tree should be removed, for we too often find upon microscopic examination a vein invaded by bacteria or thrombus which during the operation we considered uninvolved.

In those cases in which, owing to an inflammatory condition of the vein, the vessel has become soldered to its surrounding tissues, and in consequence is difficult to remove, time should not be sacrificed in trying to exsect it. The main vessel and its branches should be ligated and slit open and the neck wound should not be sutured.

The attempt at primary union in these neck wounds is so contrary to surgical principles and so signally fails that it should not be made. We are scarcely justified in imposing upon an already septic patient, whose fight for life is desperate, the danger of an unnecessary neck infection, when the only advantage gained is a remote possibility of a better cosmetic result.

After the operation it is the custom of some to flush the jugular bulb and that portion of the vein which still remains in the neck, introducing the nozzle of a syringe into the vein and forcing the stream through into the sinus, or *vice versa*. If we place carmine granules in the jugular bulb, or in the lower portion of the sinus of a cadaver, and practise through-and-through irrigation, the wide dissemination of these granules to be seen upon dissection will convince us of the danger of this practice. If through-and-through syringing is done, it is far safer (as can be proved by actual demonstration in the above manner) to irrigate from the sinus through into the jugular—*i. e.*, in the natural direction of the current, than to irrigate from the vein through into the sinus. This is due to the manner in which the tributaries enter the bulb, and to the arrangement of the plicas about their mouths. Either practice should be condemned.

After the removal of the jugular, a bent curette should be inserted into the bulb end of the sinus and such portions of the thrombus as can be detached should be removed. During this manipulation, pressure should be made over the upper end of the internal jugular vein of the opposite side, as aspiration of the involved bulb may occur through this avenue.

The eradication of the bulb of the jugular vein, as described by Grunert, where the sinus, bulb, and jugular vein are converted into a continuous groove with a common

external opening, is a procedure with which the writer has had no experience. In the review of Grunert's monograph by Arnold Knapp¹ the operation is said to be indicated when, with the continuation of severe pyæmic symptoms, the disintegrated thrombus of the jugular bulb cannot be satisfactorily treated by manipulation from the sinus above or the vein below, or by irrigation, and in certain forms of primary bulb thrombosis.

¹ These ARCHIVES, vol. xxxiv., p. 172.

REPORT ON THE PROGRESS IN OTOLOGY DURING THE THIRD QUARTER OF THE YEAR 1904.

BY PROF. ARTHUR HARTMANN.

Translated by Dr. ARNOLD KNAPP

ANATOMY AND PHYSIOLOGY.

242. KATZ (Berlin). The stria vascularis of the bat. *A. f. O.*, vol. lxii., p. 271.
243. KEILSON (Russland). Anatomic and topographic investigations on the mandibular condyle and on the external auditory meatus. (From the Ear Clinic of Professor Passow.) *Inaug. Dissert.*, Berlin, 1904.
244. PASSOW (Berlin). Anatomic examinations on the occurrence of fractures of the auditory canal, with demonstration of patients. *Deutsche med. Wochenschr.*, No. 31, 1904.
245. DELOBEL (Paris). Topographic iconography of the ear in the new-born. *Arch. intern. d'otol.*, etc., vol. xvii., Nos. 1-3, and vol. xviii., No. 4.
246. BIELSCHOWSKY (Berlin). Impregnation with silver of the neurofibrillæ. *Four. f. Psychol. u. Neurologie*, iii., 1904.
247. INGERSOLL. A study of the development of the nose and its accessory cavities. *Ann. of Otol., Rhin., and Laryngol.*, June, 1904.
248. BUSER (Reinach). Are the high palate, narrow and V-shaped curvature of the alveolar arch, as well as anomalies in the position of the teeth, a consequence of mouth-breathing and of labial pressure? *Arch. f. Laryngol.*, vol. xv., part 3.
249. GENTER. On the presence of cartilage in the tonsils. *Wratschebnaja Gazeta*, No. 27, 1904.
250. STEIN (Moscow). The physiologic importance of the centrifuge to determine disturbances of functions of the aural labyrinth. *Le physiologiste Russe*, Nos. 48-60, 1904.
251. BARTH (Leipzig). On the formation of the human voice and its timbre in singing and speaking, from physiologic and physical standpoints. Leipzig, Johann Ambrosius Barth, 1904.

242. The two microscopic sections of the stria vascularis which KATZ has demonstrated before the German Otological Society, 1904, are reproduced in the accompanying plate. The condition found present in the second section, which was stained according to van Gieson, shows that the stria vascularis is not a true epithelium carrying blood-vessels, but is composed of a number of different tissues (epithelium, vessels, and connective tissue).

HAENEL.

243. On Passow's instigation, the author examined a large number of skulls, with especial reference to the lower jaw and the relation of its articular head to the bony ear-canal. If the axes of the articular heads are horizontal, the condyle in the presence of a well-developed posterior articular process is of little account for the anterior canal-wall, and an injury to the latter does not follow a traumatism. If, however, the axes of the articular heads converge, their medial ends, especially when the posterior articular process is small, are apt to injure the anterior bony canal-wall. In this case a slight injury suffices to cause a perforation of the anterior bony canal-wall.

BRUEHL.

244. PASSOW has observed a case of direct fracture of the auditory canal (a shot wound) and three cases of indirect fracture (in one a fall from the stairs, in two a fall from a bicycle), and discusses the anatomic relations which are of moment in producing a fracture of the auditory canal. Of greatest importance in this connection is the very variable thickness of the anterior auditory canal-wall and the varying development of the posterior articular tubercle as well as the form of the condyle. If the bony spiculæ which are produced by a blow against the inferior maxilla are cast off, a depression results in the anterior wall, and movements of the jaw cause a displacement of the membranous canal. If, on the other hand, the bony spiculæ reattach themselves, a marked formation of callus results, with subsequent stenosis of the auditory canal.

NOLTENIUS.

245. DELOBEL made sections through the labyrinth and middle ear of the new-born in three different planes, and photographed certain sections from each of these series. The thirty-one illustrations are accompanied by a short text and are of service in elucidating the normal microscopic anatomy of the ear.

OPPIKOFEK.

246. After fixation of the central organ in 12 % formalin, wash-

ing in water, staining twenty-four hours in 2 % nitrate of silver, two to ten minutes in an ammoniacal solution of silver, reducing in a 20 % solution of formalin, and finally treating the sections with gold-chlorid-acetic acid to remove the insufficiently reduced silver, the sections are placed for half a minute in 5 % sodium thio-sulphate. The axis-cylinders and intracellular fibrillæ appear as dark or pale brown threads on a pale brown background. The author examined the intracellular structure in normal and pathological conditions. The silver impregnation method, however, is of most purpose to demonstrate the axis-cylinders. Non-medullated nerve fibres were demonstrated in organs where they had not previously been observed, as in myelitis, scars of the spinal cord, tumors, atrophic optic nerve, multiple sclerosis, and in the cortex of paralytics. Micro-photographs show the excellent results which this method furnishes. It will without question be of considerable service in the histo-pathology of the ear.

BRUEHL.

247. After a description of the development of the olfactory organ, INGERSOLL summarizes his studies of the nose in fishes, frogs, alligators, turtles, birds, dogs, cats, wolves, foxes, bears, beavers, seals, rabbits, guinea-pigs, lions, deer, sheep, cows, pigs, buffaloes, horses, elephants, monkeys, and man, as follows: The olfactory organ in fishes consists of two sac-like structures, each of which communicates with the exterior by two openings, but the nasal cavities do not communicate with the mouth. The turbinals are represented by prominences on the medial wall. In dipnoi, the nasal cavities open into the mouth. In reptiles, the nasal cavities are subdivided into olfactory and respiratory regions and the turbinal structures are more highly developed. The secondary palate separates the posterior nares from the mouth. In birds, the turbinal structures are all the more complicated and the ethmoidal turbinals especially show a still higher degree of development. In macrosmatic animals (with acute sense of smell), the turbinals are exceedingly complicated scrolls forming intricate labyrinths. The accessory cavities of the nose all contain olfactory turbinals. In microsmatic animals (without acute sense of smell), the turbinals show evidences of degeneration or reversion and are simple structures. The accessory cavities contain little or no turbinal tissue. It seems, therefore, that in man the accessory cavities of the nose are rudimentary structures. The paper is accompanied by seventeen

plates illustrating these relations in the turtle, duck, dog, and man.

M. TOEPLITZ.

248. The measurements of the skulls and palates of 514 skulls, with good teeth, of living adults show plainly that there is a co-relation between the form of the facial skeleton, of the bony entrance of the nose, and of the hard palate, and also the presence of a leptoprosope and of a chamæprosope type of facial skull. The leptoprosope type, associated with a high, narrow bony entrance of the nose, shows a high, narrow palate, with correspondingly narrow alveolar arch (want of room for the teeth of the second dentition, anomalies in the position of the teeth, V-shaped bend of the alveolar arch), while the chamæprosope shows the broader conditions as regards the bony entrance of the nose, palate, and alveolar arch. As adenoid vegetations and hyperæmia of the nasal mucosa more readily occlude the narrow respiratory fissures of the leptoprosopes, and do not produce this effect so readily on the broad respiratory fissures of the chamæprosopes, we find more frequent mouth-breathing resulting from adenoid vegetations in leptoprosopes than in chamæprosopes. The occurrence of mouth-breathing with a high palate, narrow and deviated alveolar arch, is most easily explained by the co-relation in the development of the face, so that measurements of the mouth-breathers with adenoid vegetations usually show a high palate and narrow alveolar arch. The anatomic relations contradict the possibility of a compressing influence of the slightly relaxed muscles of mastication and of the cheeks on the facial skeleton, and an influence exerted by these on the form of facial skeleton in mouth-breathers.

ALBANUS.

249. Up to the present time cartilaginous tissue has been observed by a few authors only in the faucial tonsils. The author has examined a large number of pharyngeal tonsils with the microscope. In forty-five pharyngeal tonsils cartilaginous tissue was found in four. All of these four tonsils were removed from cadavers belonging to children from one to ten months of age.

SACHER.

250. Descriptions and illustrations of two instruments: a centrifuge with a dynamic goniometer and a static goniometer. With the centrifuge, rotations of the patient can be produced in a sitting posture, in dorsal decubitus, or when lying on the side.

The static goniometer shows whether the patient is able to continue in an upright position (a board which can be elevated on which the patient stands; the angle to which the patient falls in a forward, sideways, or backward direction can be measured). The dynamic goniometer consists of a dial which is attached to the back of the neck, which shows during rotation on the centrifuge deviations to the right or to the left. Two cases are cited (1, disturbance in the organ of the sacculæ which governs movements in the vertical direction—*asynergia saccularis incompleta*; and 2, hyperæsthesia) which show the diagnostic and therapeutic importance which the centrifuge and the goniometer have both for the otologist and the neurologist. BRUEHL.

251. In a paper meant principally for singers and teachers of singing, the following questions are raised: How does the voice originate? and in what way is it possible for us to produce a change in its intensity, pitch, or timbre? The author shows the dependence of the development of the voice and the formation of the timbre on the ear, and emphasizes the importance of thorough respiration which can be acquired by imitation of a good singer, preferably one of the same pitch. The physical laws of the formation of the voice are exhaustively described. The author warns against the custom of the singing schools to obtain a stationary condition of the chest and of the apices of the lungs. In conclusion the important points for the production of the voice are collected as follows: 1. The respiratory process, the usual deep respiration, is no different for the requirements of the singer and of the speaker than for all other persons. It is, of course, necessary that respiration should be properly performed. 2. Respiration is, of course, a reflex process which begins independently from birth. The kind and manner of respiration depend upon the demands made upon them. 3. Singers and speakers must learn to breathe sufficiently deep at the proper periods and during expiration to make use of the air in the most profitable manner. 4. To properly develop and preserve the voice, a necessity is good hearing, which must be trained in a particular manner for the musician. 5. The method of the formation of sound must in all cases take place in the larynx. The pitch depends only upon the tension of the laryngeal muscles. 6. The clang tint of the voice in singing and speaking depends upon the various adaptations of the mouth-piece and solely upon this as far as it is influenced by the will. The same

holds true for the vowels and consonants. 7. It is self-evident that in singing and speaking respiration, larynx, and mouth-piece are never used separately but all conjointly. 8. Practically the adaptation of the larynx can only be excited and controlled by way of the ear. For the lips, jaws, tongue, and palate, in addition to the hearing, we have also the sensation of position as well as the control with the eye. BRUEHL.

GENERAL.

a.—REPORTS AND GENERAL COMMUNICATIONS.

252. GRUNERT and DALLMANN (Halle). *Annual Report of the Royal University Ear Clinic in Halle, from April 1, 1903, to March 31, 1904.* *A. f. O.*, vol. lxii., p. 74.

252. After the usual statistics of the number of patients and diseases, 7 cases are reported with many features of interest. These were cases of sinus and bulb thrombosis. In 5 the operation for bulb thrombosis of Grunert was practised. In 2 cases the operation on the sinus with irrigation of the bulb from the exposed jugular vein resulted in recovery. One case of healed abscess of the temporal lobe and of the cerebellum is reported in which the symptoms, as well as the result of lumbar puncture (clouded fluid with increased leucocytes) suggested a leptomeningitis. The subsequent course led to exposure of the cerebellum and of the temporal lobe, which was at first without result. Subsequently pus was evacuated through the incision. Of the 17 fatal cases during this year, 15 are fully reported. In 3, death occurred independently of the aural condition, in 1 following uræmia, miliary tuberculosis, leptomeningitis. In the remaining 14 cases where death followed the ear lesion, the immediate cause of death was: in 6 cases leptomeningitis, in 4 pyæmic metastases, in 2 sepsis, 1 miliary tuberculosis, and 1 cardiac weakness. The individual features should be read in the original. We shall only draw attention to 3 cases which were of peculiar interest. Case 1.—Rapid septic course of an acute otitis due to streptococcus infection with an extensive thrombus of the sinus and of the bulb. Death followed eighteen days after the onset of the aural lesion. The condition which resembles meningitis and the intrameningeal hemorrhages which were found at autopsy were the result of a severe disturbance of circulation in the brain. Case 7.—In purulent thrombophlebitis

after chronic purulent otitis, lumbar puncture showed a yellowish fluid containing streptococci and suggested a leptomeningitis. Autopsy did not reveal any signs of a purulent meningitis but only spinal leptomeningitis, produced by a deep abscess starting from the ear and passing into the spinal canal by way of the intervetebral foramina. Case 15.—In a chronic middle-ear sup-puration, with central perforation of the drum and without any signs of a severe destructive process in the bone and sinuses, thrombosis developed and a cerebral abscess. No operation. Death. The case was first explained by autopsy. The table of mastoid operations at the conclusion of the report shows that 136 operations have been performed. HAENEL.

b.—GENERAL PATHOLOGY AND SYMPTOMATOLOGY.

253. DENKER (Erlangen). On the hearing and frequency of infectious diseases in childhood and in adolescence, from personal observations. *Zeitschr. f. Medizinal-beamte*, 1904, 15.
254. NADOLECZNY (München). On diseases of the middle ear in measles. *Jahrbuch für Kinderheilkunde*, n. F., vol. ix., Ergänzungsheft.
255. SUGER (Budapest). Acute poisoning with anilin after the employ-ment of a local anæsthetic in the ear. *A. f. O.*, vol. lxii., p. 248.
256. TREITEL (Berlin). On disturbances of hearing for music and for conversation. *Deutsche med. Wochenschr.*, 1904.
257. JAENICKE (Berlin). Hearing for voice in idiots. *Medizin. pädag. M. f. d. ges. Sprachheilkunde*, 1904.
258. HECKEL (Paris). Neurasthenic deafness following a mild lesion of the Eustachian tube. *Arch. internat. d'otol.*, etc., vol. xviii., 1904, p. 135.
259. CORNING. The suppression of rotary vertigo; its bearing on the prevention and cure of seasickness. *N. Y. Med. Jour.*, Aug. 13th.
260. BEST. Boric-acid poisoning. *Amer. Med. Assoc.*, Sept. 17, 1904.
261. LAUDER. An inquiry into the source of scarlatinal infection and its bearing upon hospital treatment. *Lancet*, March 12, 1904.

253. Four thousand seven hundred and sixteen schools were examined—high schools and elementary schools. About the same percentage occurred for measles, diphtheria, meningitis, and mouth-breathing in both schools. There was a difference in purulent otitis, scarlet-fever, and influenza—in the high schools 8.6 % while 12.8 % of purulent otitis in the elementary schools,—due to social and hygienic conditions of the lower classes of the population. In the high schools 21.8 % were affected with scarlet-fever and in the elementary schools 11.7 %. A greater number were affected from influenza in the high schools than

in the elementary schools, 35.7 %, 15.3 %. A cause for this is found in the advanced age of the scholars in the high schools, in which the children are not so liable to an infection with measles as with scarlet-fever or influenza. Of 9243 ears which were examined, 75 % were normal. The author believes that properly trained teachers should undertake hearing examinations in their classes, and that all children who hear the whisper voice in less than 2 metres should be taken to the aurist. Children with fetid otorrhœa should not be admitted to schools. BRUEHL.

254. The author was able to examine the ears in a large epidemic of measles with a mortality of 3 % in 100 children varying in age from five months to ten years; 59.5 % of all the patients with measles suffered from acute inflammatory middle-ear diseases. According to the author, the aural lesion is the most frequent complication of measles. The ear disease begins generally in the first two weeks after the eruption, occasionally in the prodromal period, and rarely at the time of desquamation. The author believes this to show that the otitis in measles is primarily of nasal origin. The duration of the inflammatory appearances in the drum was in the acute tympanic catarrh, on an average, eleven days; in a suppuration, about three weeks. Hemorrhages or similar appearances in the drum membrane were observed in the course of the mastoid process, as well as dangerous complications of otitic nature. The diseases of the internal ear were not observed. Other complications in measles, such as pneumonia and severe bronchitis, were generally associated with aural disease. The treatment of the suppuration is best made by the use of hydrogen peroxid. The purulent discharge is forced out by this agent. SUCKSTORFF.

255. The author has observed, after the use of the well-known Gray's mixture to anæsthetize the middle ear of a child nine years of age in order to remove granulations from the tympanum, an acute anilin poisoning, and consequently advocates caution in the use of this agent. Orthoform and anæsthesin are also poisonous, because they are anilin derivatives, and should be used cautiously, especially in children. The author is especially opposed to the oily solution of anæsthesin as advocated by Haug. HAENEL.

256. In a short communication, TREITEL describes two personal and a number of other observations of disturbances of

hearing for music and for the voice, and cites the opinions of the older authors. Most of these are agreed that a disturbance occurs in the nerve-end apparatus as a consequence of the middle-ear suppuration.

NOLTENIUS.

257. The author deduces the following conclusions:

1. The feeble-minded child is often regarded as deaf because it cannot make use of its peripheric hearing on account of mental and vocal backwardness.

2. The education of these idiotic children should seek to improve the peripheric hearing and also to develop the central hearing for voice.

3. This is possible through the voice, so that the education must consist of rational instruction in articulation and observation.

4. This instruction is an integral part of the methods of instruction and does not require special appliances for the so-called deaf children.

The author, therefore, apparently is of the opinion that the pupils to be found in classes for the deaf are really not deaf, but only feeble-minded. He does not appear to have much confidence in the medical judgment.

BRUEHL.

258. A neurasthenic female patient, twenty-seven years of age, suffered from bilateral deafness, which was regarded by a number of specialists as incurable on account of a dry middle-ear catarrh. The patient was cured by general treatment. The author, therefore, speaks of a neurasthenic deafness.

OPPIKOFEK.

259. Experiments were carried out on artificially induced vertigo by means of a revolving chair. The drugs of most value were found to be hyoscin and opium or morphin. Hyoscin hydrobromid, $\frac{1}{16}$ gr., and opium, $\frac{1}{2}$ gr., were effective. The drugs rendered the patient proof against giddiness and nausea for from three to four hours, while a tablet of morphin, $\frac{1}{4}$ gr., extract of cannabis indica, $\frac{1}{4}$ gr., nitroglycerin, $\frac{1}{32}$ gr., strychnin sulph., $\frac{1}{16}$ gr., resorcin, 1 gr., cocain hydrochlorid, $\frac{1}{4}$ gr., was sufficient to continue the immunity for a like period.

W. SOHIER BRYANT.

260. The author reports one case in addition to four fatal and five cases of severe intoxication found in literature. Best's case was operated on for lymphadenitis and 6 oz. of boric-acid

powder were placed in the wound, which was sealed up without drainage. On the evening of the third day a diffuse erythematous and slightly papular rash appeared on the neck, chest, and shoulders, which increased. On the fourth day, marked cyanosis, vomiting, delirium; temperature 100.8°; death. BRYANT.

261. LAUDER, in an extremely able paper, brings forward evidence to show that "return cases" of scarlet-fever are not attributable to the peeling condition, but mainly to undetected discharges from the respiratory passages and ears in those who have left the hospital. CHEATLE.

C.—METHODS OF EXAMINATION AND TREATMENT.

262. OSTMANN (Marburg). **A series of mounted tuning-forks for an objective hearing measure.** *A. f. O.*, vol. lxii., p. 53.

263. OSTMANN (Marburg). **Enlargement of my tables on the hearing function to tables of sensitiveness of the deaf ear.** *A. f. O.*, vol. lxii., p. 48.

264. OSTMANN (Marburg). **Clinical studies on the analysis of disturbances of hearing. Part III: The curve of sensibility in the ear deaf from cerumen.** *A. f. O.*, vol. lxii., p. 26.

265. MIGNON (Nizza). **Examination of the bony cavities of the skull with the tuning-fork.** *Annales des maladies de l'oreille*, etc., 1904.

266. HAMMERSCHLAG (Vienna). **On simulation of ear disease in regard to accidental injuries of the ear.** Wien, 1904, *Verlag von Moritz Perles*, p. 80.

267. VOSS. **A practical apparatus to be used in catheterizing in ear disease.** *Deutsche med. Wochenschr.*, No. 29, 1904.

268. BERNOUD. **The treatment of deafness with insufflations of hot air.** *Wiener med. Blätter*, No. 39, 1904.

269. BABINSKI (Paris). **The treatment of affections of the ear, and especially of all vertigo, by lumbar puncture.** *Annales des maladies de l'oreille*, etc., 1904, Feb.

270. WAGNER (Vienna). **On the treatment of endemic cretinism with thyroid-gland substance.** *Wiener klin. Wochenschrift*, No. 30, 1904.

271. MÜLLER (Hamburg). **On the use of suprarenalin and adrenalin in hemorrhage.** *Wiener klin. Rundschau*, No. 35, 1904.

272. TRAUTMANN (München). **A new modified reflector.** *Münchener med. Wochenschr.*, 1904, No. 29.

273. COLLET (Lyons). **Salpingoscopy.** *Annales des maladies de l'oreille*, etc., 1904, Jan.

274. BRUNSCHVIG (Havre). **A malleus extractor.** *Annales des maladies de l'oreille*, etc., 1904, Jan.

275. GRÜNWALD (München). **Several new instruments.** *Arch. f. Laryngol.*, vol. xvi., part 1.

276. VOSS. **A new cutting forceps for the nose.** (Ohrenklinik d. Kgl. Charité, Berlin.) *Münchener med. Wochenschr.*, 1904, No. 31.

277. TAPTAS (Constantinople), On narcosis with bromethyl. *Arch. internat. d'otol.*, etc., vol. xviii., 1904, p. 215.

262. The following precautions are necessary in the use of tuning-forks as an objective hearing measure :

1. The equally tuned forks must possess the same medium intensity.
2. The dampening of each individual fork must be known.
3. The dampening necessary for each fork must always be the same.
4. The physician and patient should observe the dying-out of the fork always under the same conditions.
5. The source of errors produced by fatigue of the ear must be reckoned with.

As condition 1 is not regarded in the use of Edelmann's forks, the author has had tuning-forks produced by a Marburg firm, under his personal supervision. Each fork has a table of corrections for its corresponding dampening. Condition 3 is met by a firm mount for the forks ; conditions 4 and 5 by practical appliances in the mounting.

HAENEL.

263. The author has extended his tables on the examination of the hearing to include tables on the sensitiveness of the deaf ear, so that the investigator, immediately after having determined the different time, may read off from the tables the logarithmic sensitiveness of the deaf ear for the tone examined for.

HAENEL.

264. In the "Hearing Relief" of the author, published in *A. f. O.*, vol. lxi., p. 137, the normal sensitiveness for the varying pitch has been incorrectly placed as equal to 1. This error has been corrected by substituting the values found by Wien. According to the curve of Wien for the logarithmic sensitiveness of the normal ear, the author has constructed curves of the logarithmic sensitiveness of disturbances of hearing produced by cerumen, and concludes as follows :

1. The course of the curve of sensitiveness of the ear deaf from cerumen is typical.
2. The typical course is characterized by the fact that the sensitiveness for all tones between C and c^4 sinks more for the high tones than for the low ones.
3. Notwithstanding the marked diminution of sensitiveness in the high octaves, the sensitiveness remains greater for these than

for the low octaves, because the normal sensitiveness for the former is unusually larger than for the latter.

4. This fact mentioned under 3 explains how, notwithstanding incorrect premises and an incorrect measure of hearing, we do not arrive at any incorrect differential diagnostic conclusions.

5. The course of the curve of sensibility of the ear deaf from cerumen is sufficiently determined by the measure of hearing of the two forks, C and c⁴. It is thus possible to determine the curve in a few minutes.

In conclusion, OSTMANN gives the curve of sensibility of an ear deaf from labyrinth disease and after loss of hammer and anvil.

HAENEL.

265. If the mastoid antrum, the frontal sinus, or the maxillary sinus contain fluid, a vibrating tuning-fork placed upon one of these cavities will be heard less distinctly than on the other side, when a phonendoscope is placed over the cavity next to the tuning-fork, due to the diminished resonance of the air enclosed in the cavity. This method is apparently an improvement on the auditory and optic methods of demonstrating fluid in the skull cavities. Unfortunately it appears to be least advantageous in the case of the sinus frontalis, where it would be most valuable.

BOENNINGHAUS.

266. HAMMERSCHLAG, in this paper, gives a complete description and criticism on the methods of examination for simulation.

HARTMANN.

267. In the Charité Ear Clinic, in Berlin, an apparatus is employed, which was made by Détert, which consists of a cylinder, capable of standing three atmospheres of pressure, into which filtered air is forced by a hand pump. The quantity of air necessary for catheterizing is obtained by a bulb-like arrangement, which reduces it to the desired force. Two manometers, one at the cylinder and one at the valve, show the quantity of fluid contained. The apparatus is apparently serviceable, though the relatively high price of \$16 may prevent it from becoming popular.

NOLTENIUS.

268. In sclerosis, BERNOUD insufflates hot air with an apparatus of Beek's. The air passes through a metal cylinder, which contains an electric lamp. The temperature can be regulated. The author, who is himself very sceptical, states that tinnitus disappears and a small improvement in hearing takes place.

WANNER.

269. In 106 patients in the Hôpital de la Pitié suffering from labyrinth symptoms, partly primary and partly secondary to sclerosis or old otitis media, BABINSKI has attempted to diminish the symptoms by lumbar puncture. He was successful to an astonishing degree in the case of vertigo, especially primary labyrinthine vertigo. Vertigo existing for months, or even years, disappeared after one or rarely repeated punctures evacuating 15-20 ccm. The hearing, which had been absent for many years, was so much improved in two cases that the ordinary voice could be heard at the ear. The paper contains no case histories; these are all collected in the dissertation of Lumineau. The author is not an aurist, but is well known by his valuable papers on galvanic-aural vertigo. The examinations of the ears have been made by an aurist, Dr. Weill. It is clear that lumbar puncture would relieve intralabyrinthine pressure on account of the pressure between the labyrinth lymph spaces and the lymph spaces of the skull. That lumbar puncture should, however, produce such results, and apparently permanent results, in old and severe disturbances of the labyrinth is remarkable.

BOENNINGHAUS.

270. Seventy-two cretins were treated, showing the advantages of the treatment. Even in endemic cretinism—the case came from Steiermark—after treatment continued for months or years, an increase in the growth was noticed to a marked degree. In endemic cretinism, according to these observations, there is also a retardation in the formation of bone and cartilage, and retarded ossification of the epiphyses. With the increase of growth there is a simultaneous loss of flesh from a disturbance of the cutaneous swellings. The mental condition was improved; some of the children could attend school. A decidedly favorable influence was exerted on the speech and hearing. The thyroid tumors diminished and the children lost the typical physiognomy. Usually one thyroid-gland tablet was given every day and continued for several years.

WANNER.

271. MÜLLER describes the gauze, cotton, and tampons made after his suggestions, which are sterile and contain a certain amount of stable adrenalin and suprarenalin. The gauze contains $\frac{1}{2}\%$ –1%, the cotton 1 to 1000, the tampons contain both ingredients. The hemorrhage dissolves the suprarenalin and the adrenalin, and the action then takes place.

The maximum internal dose is 1ccm of a $\frac{1}{1000}$ solution. A result is usually obtained in doses from 0.0001 to 0.00075g.

WANNER.

272. The opening for the eye is situated at the margin of the mirror. The author has used this reflector for many years now with satisfaction.

SCHEIBE.

273. COLLET has investigated the salpingoscopy of Valentine, which consists in the examination of the opening of the Eustachian tube with a cystoscope, which is passed through the nose. The method permits a deep survey of the tubal ostium, though it is inferior to posterior rhinoscopy as it does not furnish as good a picture of the naso-pharynx.

BOENNINGHAUS.

274. The author has modified Delstanche's ring-knife with a harpoon-like appliance which, after the tensor has been divided with the ring-knife, grasps the hammer and facilitates its rapid removal. This simple instrument appears to be practical.

BOENNINGHAUS.

275. 1. A forceps for polypi and similar to a bone forceps with broad blades.

2. To remove the internal wall of the maxillary sinus a chisel is suggested with two cutting edges.

3. To retract the upper flap during the operation on the maxillary sinus.

ALBANUS.

276. The forceps grasp large pieces and do not interfere with the field of operation.

SCHEIBE.

277. TAPTAS recommends narcosis with bromethyl to remove faucial or pharyngeal tonsils in nervous individuals. Adults are tied to a specially constructed chair.

OPPIKOFEK.

d.—DEAFMUTISM.

278. KLUG (Budapest). **Examination of a patient without labyrinth.** *Annales des maladies de l'oreille*, etc., 1904, Jan.

278. Bilateral necrosis of the labyrinth has thus far only been observed three times. KLUG has observed a fourth case in a child six years of age after scarlet-fever. After removal of the sequestrum the child recovered, though of course deaf and became mute. In this child the author observed static symptoms of defect which are presented by a number of deaf-mutes: uncertain gait with closed eyes, lack of orientation in the bath, the

absence of rotatory vertigo and galvanic vertigo. A short and clear review of our present physiological knowledge on the static apparatus, with literature. BOENNINGHAUS.

EXTERNAL EAR.

279. BING (Vienna). On congenital aural fistula. *Wiener klin. Rundschau*, No. 33, 1904.

280. SCHEIBE. On congenital bilateral atresia of the auditory canal. *Münchener mediz. Wochenschrift*, No. 2, 1904.

281. OELHAFEN. Foreign body in the ear. *Münchener mediz. Wochenschr.*, 1904, No. 27.

282. MANCIOLI (Rome). The tympanic membrane and the detonations of firearms. *Arch. internat. d'otol.*, etc., vol. xviii., p. 504.

279. Among a number of cases observed by BING there was one in which, in addition to a bilateral suppurating fistula, there was a fistula on the left side of the neck which also discharged moderately. WANNER.

280. In this patient it was possible to produce an artificial meatus. As in these cases not only the auditory canal but the os tympanicum and the drum membrane are absent, the mastoid antrum was opened, and the field of operation was kept open by transplanted skin flaps. Conversational voice, which was heard before the operation at a distance of 10cm, was later heard at 18cm. Hearing was especially improved for noise, hearing for deep tones had improved by two octaves. HARTMANN.

281. A living flea in the ear which had produced pain and vertigo. SCHEIBE.

282. After experimental investigations, MANCIOLI concludes that detonation produces rupture of the drum membranes only in ears which have had previous ear trouble and never in healthy ears. Experiments were performed as follows: The auricles of four rabbits were fixed and a speculum was introduced into the meatus in order to straighten the canal. Then at varying distances from the ear (50-0.25cm) and in different positions shots were fired. In all four cases the drum remained intact. OPPIKOFEK.

MIDDLE EAR.

a.—ACUTE OTITIS MEDIA.

283. HECKEL (Paris). Physical and clinical proofs of the non-existence of a cavity in an inflamed middle-ear. *Arch. internat. d'otol.*, etc., vol. xviii., 1904, p. 190.

284. TAPTAS (Constantinople). On acute latent suppurating mastoiditis as a complication of acute catarrhal otitis of the middle ear. *Arch. internat. d'otol.*, etc., 1904, vol. xviii., p. 477.

285. BÜRKNER (Göttingen). On the question of paracentesis. *A. f. O.*, vol. lxii., p. 177.

286. PANSE (Dresden). On the operative treatment of aural inflammation. *Münchener mediz. Wochenschr.*, 1904, No. 27.

287. HEERMANN (Kiel). The importance of the actual question of the treatment of acute otitis media for the general physician. *Sammlung zwangl. Abhandlungen*, viii., 2.

288. SEGURA (Buenos Ayres). A case of bilateral Bezold's mastoiditis; operation; recovery. *Annales des maladies de l'oreille*, etc., Feb., 1904.

289. KOBRAK (Breslau). On middle-ear diphtheria without the formation of membranes. *A. f. O.*, vol. lxii., p. 11.

290. STENGER (Königsberg). On the importance of enlarged cervical glands in purulent otitis. *A. f. O.*, vol. lxii., p. 211.

291. URBANTSCHITSCH (Vienna). On otitic gravitation abscess. *Wiener med. Presse*, Nos. 12, 13, 1904.

292. GRADENIGO (Turin). Circumscribed leptomeningitis with spinal symptoms and on paralysis of the abducens nerve of otitic origin. *A. f. O.*, vol. lxii., p. 255.

293. RICCI (Trevito). A case of paralysis of the abducens nerve of otitic origin. *Archivio italiano di otologia*, etc., vol. xv., part 6.

283. If during the course of an acute otitis media the drum membrane sinks inward, this phenomenon does not depend upon an empty cavity in the middle ear, but upon the contraction of the tensor-tympani muscle which has been invaded by inflammation extending from the tube to the middle ear. OPPIKOFEK.

284. Six case-histories are furnished to show the well-known fact that an otitis media can lead to mastoiditis or to endocranial complications without having perforated. OPPIKOFEK.

285. Forty-four cases of acute otitis media have been treated according to the method advocated by Zaufal and Piffel. The results were very unfavorable. A review of the cases of acute purulent otitis observed by the author during the last ten years shows the favorable course of the cases in which a paracentesis had been done. Those in which an early paracentesis had been performed, as a rule, were characterized by a shorter period of illness than those in which a spontaneous perforation had taken place, and complications, relapses, disturbances of function, persistent perforations, were observed more rarely.

HAENEL.

286. Care must be taken for free discharge of pus, the canals

should be dried, applications made with solution of silver nitrate, insufflation with a little iodoform boric acid or pure boric acid and packing. If the mastoid process be tender at first, ice-bag. The aural douche which, according to the experience of the reviewer, distinctly diminishes the duration, is not mentioned. PANSE objects to irrigation because it macerates the skin. It is, however, not clear to the reviewer why an irrigation lasting only a few seconds should soften the skin more than the pus which is in constant contact with the skin. It is without doubt true that the canal can be cleaned much more thoroughly by irrigation than by drying. Panse further remarks that syringing is unnecessary because pus escapes from the canal as from a drainage tube. The author does not state that his method of treatment is better than others. The objections are usually of a theoretic character which are advanced and are usually due to a misconception of surgical principles. A suppuration from the middle ear is compared to a wound. Wounds should not be tamponed, why, therefore, a purulent cavity? No surgeon will fill his drainage tube with packing. It is surely time that the introduction of gauze into the canal and tympanum should be abolished and that irrigations should be given their old position. The latter have never injured, which cannot be said of the former, as Bezold has shown.

SCHEIBE.

287. The author is of the opinion that the general practitioner should help in solving the question of the proper treatment of acute purulent otitis, and should not keep his observations to himself, but should publish them. It seems that the author pays more attention to the general symptoms in acute otitis media than to the local manifestations. It need only be stated that in ninety-seven per cent. of his cases paracentesis was not performed. He distinguishes between an otitis media in atrophic sucklings and an acute otitis media. As this paper is meant for the practising physician, terms should have been used with greater precision. I do not believe that a general physician will be able to decide what he shall do from this paper of HEERMANN'S.

BRUEHL.

288. This case of a man sixty-five years of age, suffering from influenza, is probably unique on account of its bilateral feature. Otherwise the rapid disintegration of the intervening bony septa between the mastoid cells and the vitreous table is of interest, which should have suggested an examination for sugar.

BOENNINGHAUS.

289. This communication of KOBRAK's shows the importance of bacteriological examination of the discharge in an acute otitis, especially for the recognition of aural diphtheria. By careful bacteriological examination, two cases of apparently uncomplicated acute otitis were proved to be acute middle-ear diphtheria; and, on the other hand, a case of middle-ear suppuration which was regarded as diphtheria proved not to be so. One of these cases must be regarded as a primary aural diphtheria.

HAENEL.

290. This observation shows that the glands situated behind the sterno-mastoid muscle below the mastoid process in the splenius are rarely involved in acute purulent otitis, but regularly in cases in which the mastoid process is early and deeply involved. The author regards a swelling of these glands in the course of an acute middle-ear suppuration as a valuable symptom to diagnose diseases of the mastoid process. It is, of course, necessary to exclude infection from the scalp with its influence on the glands of the neck.

HAENEL.

291. After describing two personally observed cases of otitic gravitation abscess, the author gives the anatomic path of these abscesses and quotes cases from literature.

BRUEHL.

292. From five personally observed cases and eight collected out of literature, GRADENIGO describes a clinical picture which is characterized by persistent pain in the region of the temporal and parietal bones, with simultaneous paralysis of the abducens nerve in the course of an acute purulent otitis. Agreeing with Habermann and Brieger, he believes this symptom-complex to be the expression of a circumscribed purulent leptomeningitis. These cases generally recover either spontaneously or after operations on the drum or on the mastoid process. Under certain conditions the meningitis extends and causes death (case of Katz and Case 5 of Gradenigo). The latter case is also remarkable on account of the localization of the leptomeningitis in the spinal canal, which is explained by the patient remaining out of bed as the disease ran a latent course (extension of the meningitis to the most dependent parts of the nervous system). Another proof for this spinal localization of an otitic meningitis is furnished by the case of another patient who did not go to bed until late on account of the mild course of the disease.

HAENEL.

293. As in the cases reviewed in the preceding volume of these ARCHIVES, in this case of a patient forty-three years of age, two and a half months after the onset of an acute inflammation of the middle ear, diplopia set in from paralysis of the abducens nerve, which disappeared completely in two months.

RIMINI.

b.—CHRONIC PURULENT OTITIS.

294. ALEXANDER (Vienna). On the radical treatment of peripheral facial paralysis; suture of the facial to the hypoglossal nerve. *A. f. O.*, vol. lxii., p. 1.

295. ROZIER (Pau). A case of otitis at the floor of the tympanum and at the horizontal semicircular canal; recovery. *Annales des maladies de l'oreille*, etc., 1904, Mars.

294. In facial paralysis of six years' duration, following chronic suppurative otitis, ALEXANDER sutured the facial trunk to the hypoglossal nerve. Six weeks after the operation no functional improvement could be discovered.

The previously published eleven cases of operative treatment of facial paralysis are reviewed. Three methods have been followed: 1. Suture of the divided peripheral facial trunk to the spinal accessory nerve. 2. End-to-end suture of the divided peripheral facial nerve to the divided proximal end of the hypoglossal nerve. 3. Suture of the divided facial trunk to the hypoglossal nerve. This latter method is the one favored by the author. A permanent interference in the motility of the tongue, as was observed in the case of Körte, was avoided. As an indication for operation the electrical reaction of the facial nerve before operation is most important.

HAENEL.

295. ROZIER, known by his studies on the floor of the tympanum, describes a case in which at the radical operation on the floor of the tympanum a large cavity was found, which extended in the form of a hypotympanic area under the promontory and the pyramid, whose walls were rough. Curettage and injury to the facial nerve. Later a sequestrum separated and an opening into the horizontal semicircular canal resulted. This was followed by vertigo on rotation towards the affected side; bone-conduction prolonged as before. The labyrinth was not infected from the opened-up semicircular canal, nor has this complication followed accidental opening of the semicircular canal in the radical operation.

BOENNINGHAUS.

C.—CEREBRAL COMPLICATIONS.

296. DELSAUX. Relapsing cerebral abscess. *La presse oto-laryngologique Belge*, 1904, part 7.
297. DELSAUX. Cerebellar abscess without external signs. *Ibid*.
298. HINSBERG. Otitic cerebellar abscess: infection through the hiatus subarcuatus. *Deutsche mediz. Wochenschr.*, No. 39, 1904.
299. CABOCHE (Paris). Cerebellar abscess, parietal thrombus of the lateral sinus; operation; recovery. *Annales des maladies de l'oreille*, etc., 1904, Mars.
300. MUELLER (Berlin). Complications of purulent otitis. *Fortschritte der Medizin*, No. 22, 1904.
301. FRIEDRICH (Kiel). On the surgical treatment of otitic purulent cerebro-spinal meningitis. *Deutsche med. Wochenschr.*, No. 32, 1904.
302. ALMERINI (Turin). Clinical contributions on otitic pyæmia without sinus thrombosis. *Archivio italiano di otologia*, etc., vol. xvi., part 1.
303. LUC (Paris). A case of sinus thrombosis. *Annales des maladies de l'oreille*, Feb., 1904.
304. DE CARLI (Rome). Phlebitis and periphlebitis of the lateral sinus, and thrombosis of the longitudinal sinus. *Archivio italiano di otologia*, etc., vol. xv., part 6.
305. DELSAUX. Thrombo-phlebitis of the cavernous sinus of otitic origin. *La presse oto-laryngologique Belge*, 1904, part 9.
306. LOMBARD (Paris). A case of purulent thrombosis of the cavernous sinus. *Annales des maladies de l'oreille*, etc., Feb., 1904.
307. TOUBERT. Influence of the time of operation on the final result in cases of thrombo-phlebitis of the lateral sinus. *Arch. internat. d'otol.*, vol. xviii., p. 437, 1904.
308. JUERGENS (Warsaw). On otitic septico-pyæmia. *La presse oto-laryngologique Belge*, part 8, 1904.
309. WESSELOWSOROW. On the complications of purulent inflammations of the middle ear. *Inaug. Diss.*, St. Petersburg, 1904.

296. A case of relapsing brain abscess is described and demonstrates not only the course of relapses, but also that in brain tissue, just as in other tissues, a scar formation takes place, and that lumbar puncture and an examination of the eye-grounds cannot furnish an indication for operation. BRANDT.

297. A man died of an otitic cerebellar abscess without showing any other symptoms beyond brain pressure. Operation was refused. Lumbar puncture and an examination of the eye-grounds were not made. No vertigo, no ataxia. The symptoms which Schwartze has described as characteristic for cerebellar abscess may be absent. In this case the middle cranial fossa was first exposed and the brain punctured. At autopsy the cerebrum was found normal. BRANDT.

298. The author gives an abstract of five previously published cases in which the hiatus subarcuatus or its contents (blood-vessels and surrounding connective tissue) was regarded with considerable probability as the mode of extension of a purulent inflammation, if an infection passed from the mastoid antrum to the cerebellar dura, and last to the cerebellar abscess. Two personally observed cases are then described where a similar condition was found present. In both cases it was possible to follow the path of infection by a microscopic examination. Especially in the first case was this possible as the canal, though possessing smooth walls and no trace of necrosis, showed marked pathological changes in the arteries and the connective tissue which it contained. The disease, therefore, extended without interruption from the antrum to the posterior surface of the pyramid, and finally to the cerebellar abscess. Another method of origin, as, for instance, sinus thrombosis or labyrinth suppuration, could be excluded with certainty. The second similar case is less instructive, as the vessels and the connective tissue in the course of the canalis subarcuatus presented no pathological changes. Even in this case any other path of infection could be excluded according to the author. Hence it is assumed that infectious material passed in the vessels from the mucous membrane of the diseased mastoid cells and infected the dura, and an inflammatory process developed, which in turn led to the formation of a cerebellar abscess, though the hiatus itself showed no trace of this process. The opening of the hiatus subarcuatus at the posterior surface of the pyramid makes it necessary for the disease in this locality to lead to pathological changes in the cerebellar fossa, very rarely to disease in the middle cranial fossa. It is also of interest that in the seven reported cases the disease in five affected the left hiatus subarcuatus.

MOLTENIUS.

299. After the radical operation, where the dura and sinus wall were found normal, symptoms of increased intracranial pressure gradually developed without any focal symptoms. Another operation was undertaken two weeks later. Puncture of the cerebrum was negative. Puncture of the cerebellum evacuated pus. The cavity was drained with a rubber drainage-tube. Puncture of the sinus revealed blood, but the blood was slightly clouded. The sinus was, curiously enough, not incised, so that proof for the occurrence of a parietal thrombus was not furnished.

BOENNINGHAUS.

300. In the first of two reported cases there was a purulent meningitis after purulent otitis, in which the characteristic meningeal symptoms were wanting, and the picture of the pyæmic sinus phlebitis with chills and articular metastases was simulated. The correct diagnosis was not made until after the autopsy.

The second case was a perizygomatic or epizygomatic abscess in a case of acute otitis media. After incision of the abscess the aural suppuration ceased. SUCKSTORFF.

301. FRIEDRICH has attempted in two cases to cure a purulent inflammation of the arachnoid space in the vertebral canal and the surrounding parts of the base of the skull by laminectomy—*i. e.*, by resection of one or more lumbar arches after previous opening of the skull and reduction of the original pathological focus. The result in both cases was negative. Notwithstanding, the author hopes that the indications for this operation will be so defined that the operation will be indicated in certain cases. This method of operating is contra-indicated when purulent arachnitis has already affected the convexity of the brain. The author believes that it is possible to distinguish between the diffuse meningitis extending over the convexity of the brain and the local meningitis localized to the vertebral canal and the surrounding areas of the posterior cranial fossa with involvement of the ventricles and the basal cistern. The former, generally caused by a labyrinth suppuration, is characterized by the rapid onset of the well-known symptoms of purulent cerebro-spinal meningitis with high fever, *viz.*, stupor, delirium, rigidity of the neck, spasms, chronic convulsions. The latter form occurs, as a rule, in chronic purulent otitis, with cholesteatoma, in extradural suppurations and brain abscesses, and runs a slower course, so that the organism has time to encapsulate the purulent focus. In these cases the attempt is justified to make a large counteropening at the deepest part of the purulent focus, *viz.*, in the region of the fourth lumbar vertebra, thus removing the purulent fluid from the arachnoid space by constant and active drainage. If, when this has been done, copious infusions of physiological salt solutions serve to replace the loss of the fluid in the subarachnoid spaces, the possibility of the irrigation of the subarachnoid spaces is suggested, based upon the experiment of Cordero, who has attempted to create a subarachnoid current passing from the brain to the spinal cord. NOLTENIUS.

302. The author is of the following opinion:

There is unquestionably an otitic pyæmia without sinus thrombosis. It usually arises after acute cases under the picture of the so-called osteophlebitis pyæmia of Körner, this resemblance being due to the direct extension of pus cocci in the circulation, possibly from a septic thrombosis of the smaller veins of the temporal bone.

RIMINI.

303. After the day on which the transverse sinus was opened and the disintegrated thrombus evacuated, following a preliminary ligation of the jugular vein, Luc's patient had been perfectly well for five weeks. Then emaciation, headache, vomiting, coma, and death eight days later. No autopsy. All the symptoms point to a cerebral abscess, presumably situated in the cerebellum, induced by the sinus thrombosis. The latent stage of the brain abscess, a condition of which we know very little, must have lasted five weeks.

BOENNINGHAUS.

304. A patient, twenty-three years of age, had suffered from otorrhœa for eighteen years. He was suddenly taken ill with severe rigors and hemicrania. The right mastoid process was opened. The sinus was surrounded with pus; it was incised, and a disintegrated thrombus removed. The jugular was ligated. Death followed after a short time. At autopsy, the purulent thrombus of the right lateral sinus was found, which had extended to the torcular and to the longitudinal sinus.

RIMINI.

305. After a short review of the literature on thrombosis of the cavernous sinus, in the connection of middle-ear disease with the cranial sinuses and the processes of infection, an interesting and fatal case of thrombosis of the cavernous sinus is described, with the following peculiar features: Examination of the eye-grounds revealed no abnormal condition, though later a papillitis was present. Lumbar puncture and the examination of the lumbar fluid have only a relative prognostic importance. There was no fever for a whole week. The thrombus prevented the infection. Why was this barrier overcome? Direct operation of the cavernous sinus shows little prospect of success.

BRANDT.

306. A man suffering from chronic purulent otitis on the right side, and chronic malaria, became ill with a fever of a pyæmic type, with eye symptoms on the right side, characteristic

for thrombosis of the cavernous sinus; protrusion of the eyeballs, œdema of the upper lid, chemosis, immobility of the eyeball, rigidity of the pupils, loss of vision. The process subsequently extended to the left side. Death under the symptoms of meningitis. The autopsy confirmed the diagnosis. In the tympanum there was an old putrid suppuration. Antrum and mastoid cells showed no changes. As the nasal accessory cavities were normal, the right tympanum can be regarded as the origin for the infection of the cavernous sinus. The path for the infection could not be found, as the transverse sinus, including the jugular bulb, the petrosal sinus, and the pericarotid venous plexus were found free from thrombosis and microscopically normal. A microscopic examination of the carotid plexus would probably have revealed the pathway.

BOENNINGHAUS.

307. The favorable results of operative treatment of sinus thrombosis depend more upon an early operation than upon a definite method of operation. As a proof, two hundred cases of sinus thrombosis are collected from literature. One hundred and twenty cases were operated on the first week after the appearance of the intracranial symptoms, with 25 % deaths and 75 % recoveries. The other eighty cases were operated on after one week, with 62.5 % deaths and 37.5 % recoveries.

OPPIKOFER.

308. The so-called radical operation, with resection of the mastoid process and ligation of the jugular and facial veins, does not always give a satisfactory result in otitic pyæmia. The results of serum-therapy are not sufficiently known, especially as in most cases there is a mixed infection. Our treatment is directed in the first place against the main focus, against the aural suppuration, and against the inflammation of the mastoid process. There are, however, a number of cases in which the mastoid process is free from disease, and where the middle ear alone is involved. The drum membrane may in certain cases even have regained its normal appearance, and there is nothing to show that the middle ear, the cervical veins, and the sinus are diseased, though the pyæmia has unquestionably arisen from these foci and is continually increasing.

In this case should the mastoid process be opened, or should the sinus and veins be resected? What results are furnished by an expectant treatment?

As an answer to these questions, the author publishes 11

cases, of which 9 recovered and 2 died. In all cases the operation was refused. His calculations are as follows: In pyæmia we should not operate unless we are sure that a suppuration is present in the mastoid process, or that the sinus or the jugular veins are involved. Abscesses in other parts of the body are favorable from a prognostic sense, and their exposure frequently heals the pyæmia.

BRANDT.

309. A statistical collection and description of 389 cases, which had been observed in this hospital during the last sixteen and a half years.

SACHER.

d.—OTHER AFFECTIONS.

310. SCHEIER (Berlin). An unusual injury of the tympanum. *Münchener med. Wochenschr.*, 1904, No. 35.

311. STEFANOWSKI (Kasan). Myringotomy as a method to improve the hearing in chronic otitis media (adhesive, dry, and sclerotic). *A. f. O.*, vol. lxii., p. 219.

312. SUGAR (Budapest). On the treatment of chronic middle-ear catarrh with thiosinamin. *A. f. O.*, vol. lxii., p. 241.

310. On cleaning the ear with a hairpin, the anvil was extracted. Recovery took place, with closure of the drum and diminution of hearing for whisper to $\frac{1}{2}m$.

SCHEIBE.

311. In 16 cases of chronic otitis media, excision of the drum was practised by the author, combined in 2 cases with removal of the handle of the hammer. This treatment was only followed in cases with negative Rinne, and only after treatment with catheter, massage, and so forth had proved without avail. In 62.5 per cent. after operation the hearing was improved—in all cases there was an improvement of the tinnitus and vertigo. The author is unable to state whether these results are permanent. In one case, after two years, the improvement in hearing had persisted. In all the other cases the period of observation was shorter.

HAENEL.

312. In 8 cases of chronic middle-ear catarrh, and in 2 cases of adherent drum after purulent otitis, thiosinamin was employed with benefit. The author, therefore, recommends this remedy in the beginning of otosclerosis, in adhesive processes after middle-ear suppurations, in syphilitic middle-ear catarrhs—in fact in all cases in which connective-tissue discharges and not osseous adhesions are present. The patients have borne subcutaneous injections well, and also injections through the catheter into the tympanum.

HAENEL.

NERVOUS APPARATUS.

313. VERAGUTH (Zurich). On the treatment of Ménière's vertigo. *Münchener med. Wochenschr.*, 1904, No. 20.

314. EITELBERG (Vienna). Tinnitus in progressive paralysis. *Wiener med. Presse*, No. 29, 1904.

315. ALEXANDER (Vienna) and FRANKL-HOCHWART (Vienna). A case of tumor of the auditory nerve. *Arbeiten aus dem neurol. Institut in Wien*, vol. xi.

316. BRYANT. Treatment of tinnitus aurium. *The Laryngoscope*, July, 1904.

313. Two cases are reported in which vertigo was improved after electricity, iodide of potash, and general treatment. The author is sceptical in regard to the value of the treatment, though he considers that the electricity was of decided benefit.

SCHEIBE.

314. Three cases are described which are not particularly convincing.

WANNER.

315. A man, forty-one years of age, suffered from vertigo, vomiting, headache, dementia, nystagmus, and optic neuritis. Left-sided nervous deafness (Rinne +, Schwabach abbreviated, upper tone-limit diminished). Paralysis of the left facial nerve. Autopsy revealed a tumor in the cerebello-pontal angle connected with the seventh and eighth nerves and extending into the internal auditory meatus. Histologically the tumor proved to be a narrow fibroma. In the labyrinth there was degenerative atrophy of the cochlear branch and the spiral ganglion, with atrophy of Corti's organ and of the stria vascularis, with partial degeneration of the annular band.

BRUEHL.

316. The treatment consists chiefly in relieving the exciting cause, and in most cases treating the faults in the sound-conducting apparatus, which are usually the predisposing cause. The following classification is intended to facilitate the intelligent treatment of the annoying symptom:

I. OBJECTIVE.

(A) VIBRATORY:

1. *External*: (a) Vascular. (b) Pharyngeal. (c) Respiratory. (d) Muscular.
2. *Internal*: (a) Salpingeal. (b) Tympanic.

II. SUBJECTIVE.

(A) PHONETIC.

1. *Exaural*: (a) Vital. (b) Diplacusis.

2. *Endotic*: (a) Circulatory. (b) Myotolitic. (c) Movement. (d) Somatic.
 - (B) NEUROTIC.
 1. *Peripheral*: (a) Reflex.
 2. *Otic*: (a) Conduction: I. Myringal. II. Tubal. III. Ossicular. IV. Mucous. V. Contraction. VI. Adhesion. VII. Fenestral. VIII. Traumatic. IX. Meatal. (b) Reaction.
 3. *Sensory*: (a) Nerve Tinnitus: I. Peripheral. II. Trunk. III. Proximal. (b) Psychopathic: I. Central. II. Illusional. III. Hallucinational. IV. Delusional.
- BRYANT.

NOSE AND NASO-PHARYNX.

a.—GENERAL PATHOLOGY.

317. FREUND (Strassburg). **The changes of the naso-pharynx during gestation and during the puerperium.** *Monatsschr. f. Geburtshilfe u. Gynäkologie*, vol. xx., part 2.
318. GERBER (Königsberg). **On the diagnosis of scleroma, with report of a new case from East Prussia.** *Arch. f. Laryngol.*, vol. xvi., part I.
319. DORENDORF (Strassburg). **On leprosy of the upper respiratory passages.** *Arch. f. Laryngol.*, vol. xvi., part I.
320. GOERKE (Breslau). **Degenerative changes in the pavement epithelium of the mucous membrane of the upper respiratory passages.** *Arch. f. Laryngol.*, vol. xv., part 3.
321. MANCIOLI (Rome). **Dental caries and nasal obstruction.** *Arch. internat. d'otol.*, etc., vol. xviii., 1904, p. 141.

317. After an examination of one hundred women during gestation, the puerperium, and lactation, the author concludes that there is a distinct physiological relationship between the female sexual organs and the nose. In 66 per cent. of those examined there were hyperæmia and hypertrophy of the turbinals, especially of the lower, during pregnancy. The changes in the nose during pregnancy were not periodic but continuous (nose-bleeding in 25 per cent.), and only during pregnancy a decided increase in volume of the turbinals takes place, which elicits reflexes on the part of the respiratory organs. In predisposed persons the contiguity of a hypertrophic turbinal and the septum may produce a reflex which simulates the picture of hyperemesis gravidarum. The nasal changes often persisted after puerperium. In the pharynx a hypertrophy or hyperæmia does not so

NERVOUS APPARATUS.

313. VERAGUTH (Zurich). On the treatment of Ménière's vertigo. *Münchener med. Wochenschr.*, 1904, No. 20.

314. EITELBERG (Vienna). Tinnitus in progressive paralysis. *Wiener med. Presse*, No. 29, 1904.

315. ALEXANDER (Vienna) and FRANKL-HOCHWART (Vienna). A case of tumor of the auditory nerve. *Arbeiten aus dem neurol. Institut in Wien*, vol. xi.

316. BRYANT. Treatment of tinnitus aurium. *The Laryngoscope*, July, 1904.

313. Two cases are reported in which vertigo was improved after electricity, iodide of potash, and general treatment. The author is sceptical in regard to the value of the treatment, though he considers that the electricity was of decided benefit.

SCHEIBE.

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frequently occur, but usually in the tonsils. The entire changes of appearance in the nose are due to the blood and the circulatory apparatus.

SUCKSTORFF.

318. Report of a new case. In the nose and naso-pharynx the characteristic changes, as well as in the larynx. Though the microscopic examination was negative, a diagnosis of scleroma was made. The Mikulicz cells and the bacteria are usually to be found only in fresh infiltrations, rarely in old sclerosing tissue and in the scars as in the present case.

ALBANUS.

319. After general remarks on leprosy in the Canary Islands, the investigations on the upper respiratory passages in 35 lepers are given. The observation that lepra bacilli are scattered about during speaking, coughing, and sneezing, and the hypothesis of a nasal primary affection of leprosy, cause increased interest in the leprosy diseases of the upper respiratory passages. In 35 patients, there were changes in the interior of the nose in 33. In 4 there was a previous history of nose-bleed, frequently leprosy infiltrations of the mucous membrane. In 20 of the 35 there was a perforation of the septum, ulcer of the septum in 4. Contraction and the formation of scars and marked deformity of the entire skull resulted. The turbinates were often destroyed. The sense of smell was intact. The exterior of the nose was deformed, partly by destruction of the interior of the nose, partly by infiltrations and the formation of nodules of the external nose. The usual types are: the depressed nose, the flat nose of the negro, a thinning of the tip of the nose. The nodules in the external skin of the nose were absorbed or ulcerated. Leprosy of the nose occurs frequently in the tuberous variety, rarely in the anæsthetic variety. The pharyngeal cavity was diseased in 18 cases, especially in the form of an infiltration in the neighborhood of the raphe of the palate, also in the palatal arches, the uvula, the tonsils, and the posterior pharyngeal wall. In 5 cases there were changes of the tongue (nodules, papillomatous hypertrophy, cicatricial white spots). These observations seem to prove that the mucous membrane of the upper respiratory passages, especially of the nose, serves as an extremely frequent path of infection.

ALBANUS.

320. In seven cases (round-celled sarcoma, pigment sarcoma, endothelioma of the nose, pendulous tonsil of the pharyngeal tonsil, two tuberculous tumors of the larynx, one aural polyp),

peculiar degenerative processes of various grades were observed in the surface epithelium, which led to the formation of cavities, intracellular as well as intercellular, of a homogeneous globular formation, as well as the development of an intra-epithelial reticulum. The conclusions are as follows: The cavities in the pavement epithelium of the mucous membrane are formed by the collection of lymph fluid between the cells of the Malpighian layer. In other cases the formation of cavities depends upon a degeneration of prickle cells. This degeneration may consist of a fluidification of the central plasma and lead to the well-known picture of reticular degeneration (Unna). More rarely a peculiar transformation of the protoplasm into homogeneous globules takes place which are to be regarded as colloid. All three presumably may occur in some specimens. The cause for this change of the epithelial cells is furnished by the lymph fluid which passes through the epithelium, an inflammatory process underneath the epithelium.

ALBANUS.

321. The most frequent and important cause of caries of the teeth, according to the author, is obstructed nasal respiration, because thereby the introduction of bacteria into the mouth is favored. As frequently during an acute coryza pain in the teeth starts, the author believes that even after mouth-breathing for a very short time dental caries may follow.

OPPIKOFER.

b.—SYMPTOMATOLOGY.

322. KILLIAN (Worms). On subjective cacosmia. *Münchener med. Wochenschr.*, 1904, No. 39.

322. The cause of the cacosmia in the two cases reported was found in concretions situated in unusually deep Rosenmüller's fossæ. The fetor was especially pronounced on blowing the nose. Diagnosis cannot be made with the mirror but by cleansing with the cotton probe.

SCHEIBE.

c.—OZÆNA.

323. GUARNACCIA (Catane). Gersuny's method in atrophic rhinitis. *Arch. internat. d'otol.*, etc., 1904, vol. xviii., p. 210.

324. BARATOUX. The treatment of atrophic rhinitis by interstitial injections of paraffin. *Le progrès médical*, 1904, No. 27.

325. OPPIKOFER (Bâle). The treatment of ozæna with collargol. *Arch. internat. d'otol.*, etc., vol. xviii., p. 538.

323. Based on sixteen cases, the author recommends injections of paraffin in ozæna which is not too far advanced. In four cases healing occurred; in eleven, improvement with diminution of the fetor and slight formation of scabs, so that a nasal douche was necessary only every other day. In one case the injections were without avail. In two cases there was slight œdema of the orbital tissues, which disappeared on the second day.

OPPIKOFEK.

324. The author uses paraffin melting at 50° C. An ordinary glass syringe is used with a needle 8-10cm long. The author warns against injecting more than 1ccm of paraffin at one time.

OPPIKOFEK.

325. After the suggestion of Roques and Oppikofer, the author has used collargol in twenty patients suffering from ozæna without succeeding in curing a single case. The improvement is explained by the use of the nasal douche, not from the collargol.

OPPIKOFEK.

d.—NASAL SEPTUM.

326. WEIL (Vienna). On the submucous resection of the nasal septum. *Arch. f. Laryngol.*, vol. xv., part 3.

327. FREER (Chicago). On the preceding article of Dr. Weil on the submucous resection of the nasal septum. *Ibid.*, vol. xvi., part 1.

328. HAJEK (Vienna). Remarks on some papers on the window resection of the deviated septum. *Ibid.*, vol. xvi., part 1.

326. The author has practised submucous resection of the septum for ten years. He has never used sutures, and in the first case has followed the suggestions of Trendelenburg, who warns against injury of the anterior margin of the septum. It is not unimportant if starting from the free margin the lower part of the quadrangular cartilage is sacrificed, because the small strip of cartilage along the dorsum of the nose may fracture from a slight traumatism. The author has constructed two knives in order to remove the entire cartilaginous septum in toto. The convex side is packed with iodoform gauze.

ALBANUS.

327. The author claims that he had suggested the construction of knives suitable to remove the entire cartilaginous part of the septum before Weil.

ALBANUS.

328. HAJEK replies to Mueller that according to his experience the preservation of the mucous membrane on the convex side is an improvement of the method. He did not wish to

state that the idea of the preservation of the mucous membrane on the convex side originated either with Menzel or with him. In regard to the window resection, it is principally only a modification of Hartmann-Petersen's method of operation.

ALBANUS.

c.—TUMORS.

329. RICHARDS. **A pedunculated bony tumor of the nasal septum.** *The Laryngoscope*, Aug., 1904.

330. RÖPKE (Solingen). **An endothelioma of the nasal cavities.** *Münchener med. Wochenschr.*, 1904, No. 33.

331. DONOGÁNY and VON LÉNÁRT (Budapest). **On a primary carcinoma of the nasal cavities.** *Arch. f. Laryngol.*, vol. xv., part 3.

329. In a woman, aged thirty-two, with a specific history, a small raspberry-like tumor was situated upon the posterior portion of the right septum, high up, and almost at the posterior margin of the vomer. It was $1\frac{1}{4}$ " long, pear-shaped, contained areolar tissue with many venous sinuses within, and a few racemose glands, beneath which there was a rim of bone, like a cyst of the middle turbinate, except that it had solid contents.

M. TOEPLITZ.

330. This case is one of a woman twenty-three years of age, which developed after an injury and terminated with meningitis. The tumor probably originated from the pterygoid process, was bilateral, and had led to a tumor of the angle of the lower jaw and the upper jaw.

SCHEIBE.

331. Seven cases are reported of these ear conditions. Literature is quoted and the statistics of frequency are given. In regard to the interesting question of the transformation of a nasal polyp into a carcinoma, the author brings the following observations of a case in which in an extended carcinoma there was a tumor with the appearance of a mucous polyp, the lower two-thirds of which on examination proved to be carcinomatous, the upper half œdematous connective tissue. The early symptoms in these cases were nasal occlusion, then nose-bleed, frequently profuse in character. Pain was absent in some cases; rarely very severe darting pain was experienced. The tumor was not in all cases adherent to the surrounding tissues. In four cases the origin seemed to be the region of the middle meatus and the middle turbinal, in two cases parts of the lower turbinal; in one case the site of the origin could not be determined. According to

literature, the most frequent origin is the middle turbinal. In the subsequent course severe headache, constant nasal occlusion, deformity of the nose, perforation of the tumor into the face, usually through the orbital angle, extension to the orbit and occlusion of the tubes, earache, pharyngeal symptoms, putrid discharge, loss of appetite and of strength. Death from cachexia or from meningitis, brain abscess. Metastases could not be determined clinically. Histologically six of the seven carcinomas were basal-cellular in the sense of Krompecher. Discussion of differential diagnosis. Sarcoma occurs before the fortieth year, carcinoma generally after. Cancer has a great tendency to ulceration. The tendency to hemorrhage was pronounced in only half the cases. Microscopic examination is always necessary because in one case the tumor, on account of its limitations and clinical symptoms, could have been macroscopically mistaken for a fibroma or a fibro-sarcoma. Prognosis is bad whether operated upon or not. Four cases were operated upon, three died from relapses, four cases have not been observed sufficiently long.

ALBANUS.

f.—ACCESSORY CAVITIES.

332. GUIZEZ (Paris). A case of ethmoidal mucocoele. *Annales des maladies de l'oreille*, etc., 1904, Feb.

333. LERMOYEZ (Paris). Spontaneous recovery of a true empyema of the maxillary antrum. *Ibid.*, 1904, Jan.

334. CLAOUÉ (Bordeaux). The treatment of chronic empyema of the maxillary sinus by a broad resection of the nasal wall. *Ibid.*, 1904, Jan.

335. RÉTHI (Vienna). The radical operation for empyema of the maxillary sinus from the nose. *Wiener klin. Wochenschr.*, No. 34, 1904.

336. ESCAT (Toulouse). Empyema of the ethmoidal and sphenoidal sinuses in a child of twelve years. *Arch. internat. d'otol.*, etc., 1904, vol. xviii., p. 124.

337. BURCHARDT (Bonn). A modification of Kuhnt's operation in chronic empyema of the frontal sinus. *Arch. f. Laryngol.*, vol. xv., part 3.

338. CLAUS (Berlin). The radical operation for chronic maxillary sinusitis. *Ibid.*, vol. xvi., part 1.

339. BINDER (Graz). On the extraction of a foreign body from the maxillary antrum under guidance of the salpingoscope. *Ibid.*, vol. xvi., part 1.

340. CANFIELD. The application of conservative and radical surgery to chronic nasal accessory-sinus disease. *Med. News*, July 16, 1904.

341. KELLY. Inspection of the antrum of Highmore. *Lancet*, Sept. 17, 1904.

342. SIEBENMANN (Basel). The dislocation posteriorly of the nose in the bilateral operation for frontal-sinus empyema. *Arch. f. Laryngol.*, vol. xv., part 3.

343. HAJEK (Vienna). On the diagnosis and intranasal surgical treatment of suppurations of the sphenoidal cavities and of the ethmoidal labyrinth. *Ibid.*, vol. xvi., part 1.

344. DOR. Sphenoidal and maxillary sinusitis following a specific lesion of the base of the skull, with ocular complications. *Lyon médical*, 1904, No. 29, p. 113.

332. In the left nasal cavity a mucocoele had gradually developed between the two orbits, consisting of a completely closed osseous cavity containing mucus and cholesterol crystals. Resection of the anterior wall with recovery. Of interest is first the size: the tumor had dislodged the left eyeball to the left and the septum to the right, and had pushed forward the dorsum of the nose. The cavity was as large as an orbit. Second, the etiology: The tumor developed after a traumatism of the region of the forehead. The author questions the connection. The reviewer, however, saw a mucocoele of the frontal sinus develop in two weeks after a blow on the forehead. In both cases there was hemorrhage from the other side of the nose. Is it possible that the naso-frontal duct became occluded by a fracture of the floor of the frontal sinus?
BOENNINGHAUS.

333. LERMOYEZ advises in suppurations from the maxillary antrum of dental origin to await future extractions of the teeth before deciding upon other operative measures. He has observed two cases in which the extraction of teeth resulted in recovery.

BOENNINGHAUS.

334. After resecting the anterior two-thirds of the lower turbinal, the author perforates the nasal wall of the maxillary antrum in the lower meatus with a hand trephine, enlarges the opening with a forceps, cures the cavity and fills it with gauze from the nose. This is all done under local anæsthesia. In twelve cases nine recovered. It is in general the same method which Réthi recommends.
BOENNINGHAUS.

335. To the previously published series of 5 and 6 cases an additional series of 4 new cases is added, of which 3 were cured and one improved, so that altogether there are 12 recoveries in 15 cases during an interval of one and a half to four months. The severest cases are operated upon according to this method.

After making the opening the author immediately proceeds to use the sharp spoon. Narcosis is never necessary. After operation daily irrigations, which are later made only after two, three, and four days.

WANNER.

336. A boy, twelve years of age, was taken ill with an acute suppuration of the accessory cavities which led after one week to an abscess of the inner side of the left orbit and to blindness. An examination of the eye-grounds made in the fifth week showed left-sided atrophy of the optic nerve. In the seventh week of the disease the boy was brought to ESCAT, who opened the ethmoid cells and the sphenoid from the orbit and removed the puriform mucous membrane. Recovery.

OPPIKOFER.

337. Owing to the well-known disadvantages of Kuhnt's method in extensive frontal sinuses, especially with a deep antero-posterior diameter, with prolonged treatment with irrigations and painful packings which finally result in fistulæ and deformed scars, the author removes the bone and anterior wall just as Kuhnt suggests and inserts a thick drainage tube into the dilated naso-frontal duct and closes the operative wound. As soon as the incision is healed with firm packing, the skin and periosteum of the anterior wall are then pressed against the posterior wall of the cavity in order to facilitate healing. From the periosteum and connective tissue, bands are formed which correct the depression which is at first noticeable. As opposed to Kuhnt's method of operation, which is longer and removes the protection which the orbital roof affords to the eye and connects the frontal sinus with the orbit, the author is in favor of a simpler method which has given him satisfactory results in eighteen cases. The cosmetic result was good in those cases which were operated primarily according to this method. Two complete case-histories are added.

ALBANUS.

338. The author makes a small opening in the anterior wall of the upper jaw and resects the anterior wall with Hajek's or his own bone forceps. The cavity is then freed of granulations and packed. When the discharge becomes less, tampons of protargol are introduced.

ALBANUS.

339. In a case where the maxillary antrum was operated upon on account of empyema, a gauze plug was lost in the cavity through the narrow drainage channel and kept up a continuous fetid suppuration. The canal was enlarged to $6\frac{1}{2}$ mm, and after

introducing the salpingoscope it was possible to observe the foreign body in the alveolar depression and to extract it.

ALBANUS.

340. CANFIELD bases his observations upon 200 cases of chronic disease of the different nasal accessory sinuses treated radically, and upon 110 cases treated conservatively by other operators. One-half of all chronic empyemas are simple, not combined. Complete relief can be had mostly by conservative treatment in 50 % of all chronic cases, and in 90 % of uncombined cases. The best results from thorough conservative surgery must be expected from intranasal methods, not only through that of the sinuses, but of the entire nose and nasopharynx. To establish free nasal respiration, deviations, hypertrophies, and adenoids have to be removed. Canfield enters the antrum through the inferior meatus. The cases which do not clear up are generally combined with the ethmoid. In extensive ethmoid cases the sphenoid must be examined, and if found diseased, the anterior inferior wall is removed. After all these conservative means have been exhausted, radical measures are resorted to: for the antrum, Jansen's method somewhat modified by Canfield; for the frontal sinus, Killian's, both of which are minutely described.

M. TOEPLITZ.

341. BROWN KELLY opens the antrum with a trocar, under cocaine, in the canine fossa, and introduces a speculum through the hole when the bleeding has ceased; the condition of the lining membrane can then be directly observed, and pathological conditions treated.

ARTHUR CHEATLE.

342. The bilateral operation of KILLIAN for frontal sinuses which are unusually deep in an antero-posterior direction has given the author poor cosmetic results; because the soft parts sink in above the remaining bony ridge. In two cases an excellent result was obtained. After entire or partial removal of this orbital ridge, the roof of the nose was mobilized and pushed directly backward, by removing a wedge from the bony nasal septum down to the palatal plate. The roof of the nose could then be pushed back and retained in place by a dressing.

ALBANUS.

343. This paper supplements the corresponding chapter in the author's text-book, and first treats of the diagnosis of suppurations of the accessory sinuses classed as belonging to the

second series. It is necessary first to exclude suppurations in the olfactory fissure (causes: acute coryzas, carious bone, foreign bodies). The diagnostic complications in broad olfactory fissures and in visible sphenoidal ostium are then given.

1. Empyema of the sphenoidal cavity.
2. Combination of empyema of the sphenoidal cavity and of the posterior ethmoidal labyrinth.
3. Pyosinus of the sphenoidal cavity.
4. Empyema of the posterior ethmoidal labyrinth.

These four possibilities are described with illustrative case-histories. The anatomical features are given concerning the relationship of the sphenoidal cavity to the olfactory fissure and to the ethmoidal labyrinth, with illustrations, which show that the proportion of the anterior wall of the sphenoidal cavity which is in relation to the olfactory fissure, to that which is covered by the ethmoid labyrinth, can be expressed in the proportion of three to five. Therefore, in order to resect the entire anterior wall of the sphenoidal cavity, the medial wall of the posterior or sphenoidal-ethmoidal cells must first be removed. The wall of the sphenoidal cavity can be resected by enlarging the sphenoidal ostium with the modified hook, which is much stronger than the early model. Then introduction and employment of two bone forceps (illustrations), one with descending and the other with ascending branches, to remove the lower and the upper parts of the anterior wall of the sphenoidal cavity. In the future treatment, care must be taken to prevent the covering of the edges of the wounds of the new-formed and sphenoidal cavity by sequestrations. A number of illustrative cases are given with good pictures. Finally, one case is reported in which it is possible to demonstrate an ethmoidal cell situated above the sphenoidal cavity, where a suppuration was discovered in the sphenoidal cavity and a closed empyema of the posterior ethmoidal labyrinth.

ALBANUS.

344. Three cases of optic neuritis, caused by a suppuration of the sphenoidal cavity. It seems to us, however, questionable whether, in these cases, the neuritis really depended upon the sphenoidal affection. In Case 1 there is no history, and there is only the statement that in an old man a one-sided optic-nerve atrophy was found. Based on the previous history, a sphenoidal empyema was taken for granted. In the second case, details are also absent. It is only stated that an operative treatment of

sphenoidal empyema was suggested. The patient did not consent, and, contrary to expectation, complete recovery took place. In Case 3, the diagnosis of empyema of the sphenoidal and maxillary sinuses was made. Without treatment of the sphenoidal cavity, and after opening of the maxillary sinus, the optic neuritis diminished and the suppuration ceased. As a previously existing hemianopia disappeared on antisyphilitic treatment, it seems probable that the optic neuritis was also of syphilitic origin, and that there had been no sphenoidal empyema.

OPPIKOFER.

g.—OTHER DISEASES OF THE NOSE.

345. JOSEPH (Berlin). **Diminution in size of the nose.** *Deutsche med. Wochenschr.*, No. 30, 1904.

346. ROE. **The removal of obstructions and cicatricial contractions of the nose by the plastic method.** *N. Y. Med. Jour. and Phila. Med. Jour.*, July 30, 1904.

347. MOUNIER (Paris). **Results of systematic applications of penghawar in hemorrhages of the mucous membrane of the skin.** *Arch. internat. d'otol.*, etc., vol. xviii., p. 526.

348. RHODES. **Nasal hydrorrhœa.** *Ann. Otol., Rhin., and Laryngol.*, June, 1904.

349. STÖCKEL (Berlin). **On nasal reflexes.** *Wiener klinisch-therapeutische Wochenschr.*, No. 30, 1904.

350. DE SIMONI (Mailand). **A case of bone mycosis of the nasal cavity.** *Wiener med. Wochenschr.*, No. 37, 1904.

351. MELZI (Milan). **Primary tuberculous ulcerations of the inferior turbinal.** *Arch. internat. d'otol.*, etc., vol. xviii., p. 109.

345. In a large number of patients who suffered from a deformity of the external or internal nose, and were consequently hindered in the pursuit of their professions, relief was obtained partly by a cutaneous incision and partly by a subcutaneous operation with suited instruments whereby the prominence was removed, as can be seen from the accompanying illustrations, and the normal form of the nose obtained without causing deformity from the incisions. Though this method may be suited in cases of protuberances, it is hardly to be recommended for the correction of noses which are too broad. As the frontal process of the superior maxilla is resected, and then by pressure on the lateral parts of the nose pressed toward the middle, in which position it is retained until the displaced bony fragment becomes firmly attached through the formation of callus, the purpose of narrowing the upper parts of the nose may thus unquestionably be

obtained, but at the same time the interior of the nose probably suffers an unwelcome diminution of its lumen. NOLTENIUS.

346. In the removal of obstructions, congenital narrowing, cicatricial contraction of the nasal entrance, and of occlusions of the nasal passages, wounding of opposite surfaces is to be avoided. ROE covers the denuded surface on one side with skin, mucous membrane, or healed tissue taken from the surface of the contraction or band, and explains this plastic method by several illustrations. After the removal of redundant tissue, the flaps are stitched by fine horsehair sutures, inserted into special small curved needles with a double spiral curve. This method is also used in the submucous resection of the septum and in cases of bony or cartilaginous spurs. In collapsed alæ Roe incises the shield cartilage from the inside through the skin at the point of its greatest depression, removes a small wedge-shaped portion in the cartilage with the base of the wedge towards the interior of the nose, and then stitches the edges together with horsehair sutures. M. TOEPLITZ.

347. According to MOUNIER, penghawar, which was originally recommended by Michelson, is an excellent hæmostatic. It is to be applied not only in actual cases of epistaxis but in endonasal operations. The agent has this advantage over the introduction of gauze, that the nose is not occluded, and that the threads separate spontaneously after a few days. The felt-like mass contains tannin; nevertheless its hæmostatic action is probably wholly mechanical. The activity of the agent is not destroyed by sterilization, so that it can be applied directly without danger to the bleeding areas. OPPIKOFEK.

348. RHODES relates the case of a woman, aged forty-four, with constant dripping of fluid from the right naris, which had continued for six weeks day and night. She had a similar attack before this, lasting ten days. She was of a decidedly nervous temperament, had been under considerable physical and nervous pressure previous to the attack, which came on suddenly on a very cold day with severe aching, burning, and stinging sensation in the right side of the nose, accompanied with sneezing and the symptoms of an acute rhinitis. In three days the watery discharge began. The discharge dripped on an average of about four large drops a minute, when the head was held forward. The nights were much disturbed. The nasal cavities were free and normal. The fluid was clear and limpid, spec.

gravity 1.012, alkaline. It was a serous exudate; twelve ounces were discharged in twenty-four hours. After the local use of twelve per cent. argent. nitric. (sixty grains to the ounce), the dripping ceased. Rhodes explains the case, first by a marked irritation of the terminal fibres of the vasomotor nerves in the nasal mucosa, followed by paresis and an exosmosis of fluid through loss of nervous control. The character of the fluid differentiates it from cerebro-spinal rhinorrhœa; headache was not present. A complete bibliography is appended.

M. TOEPLITZ.

349. A collection of the latest views on this subject in the form of a paper for general physicians. WANNER.

350. A patient, twenty-nine years of age, had suffered for several months from a purulent discharge from the nose and the sensation of increasing nasal occlusion; a small slightly painful tumor appeared on the hard palate, which discharged blood and a little pus. Then reddening and swelling of the right cheek in the neighborhood of the nose set in. Complete occlusion of the nasal cavities; discharge of fetid pus mixed with blood.

The nose is filled with a red fleshy, slightly bloody tumor attached to the septum, to the middle and lower turbinals, and to the floor of the nose. In the middle of the palate there is an ulcer 1cm broad. The probe passes from the palate into the nose. On microscopic examination actinomycosis is found. The differential diagnosis between the syphilitic tuberculous process and rhino-scleroma is given.

After using the curette, and the administration of iodide of potash, permanent healing took place. WANNER.

351. A girl, twenty years of age, presented a tuberculous ulcer in the middle third of the left lower turbinal. This induced the author to collect the cases of nasal tuberculosis described in literature. In 90 cases tuberculosis was primary in 19, in 5 the ulcerating form, in 14 the tuberculous. In the 5 cases of primary tuberculous ulcer, the ulcer was situated in 4 cases in the area of the mucous membrane covering the cartilaginous septum, in only 1 together with a lesion on the floor of the nose and the lower turbinal. OPPIKOFEK.

h.—NASO-PHARYNX.

352. GOERKE (Breslau). On the pathology of the pharyngeal tonsil. IV. The involution of the pharyngeal tonsil. *Arch. f. Laryngol.*, vol. xvi., part 1.

353. FISCHER (Copenhagen). **The symptoms, course, and complications of adenoid vegetations.** *A. f. O.*, vol. lxii., p. 188.

354. JARECKY. **Adenoids in infants.** *N. Y. Med. Jour. and Phil. Med. Jour.*, Aug. 13, 1904.

355. BURGER (Amsterdam). **Fatal hemorrhage after removal of the adenoids.** *Presse oto-laryngologique Belge*, No. 4, 1904.

352. The author has studied the involution of the pharyngeal tonsils on specimens obtained from cadavers, as well as from children and adults at operation. The follicular tissue was found to have disappeared and to be replaced by an indifferent tissue. The connective tissue does not increase. The ciliated cylindrical epithelium is replaced by a more resisting pavement epithelium. The pharyngeal tonsil involutes as soon as its function becomes unnecessary. This is not an immunizing process nor normally accompanied with morbid symptoms. It is only the expression of an immunity acquired in another way, especially against infectious diseases peculiar to childhood. After the involution of the pharyngeal tonsil has taken place, the histological picture of the normal pharyngeal mucous membrane is present. The involution is checked or retarded by involuntary processes which can be recognized by the microscopic picture of the not completely involuted tonsil. The involution cannot be produced in a conservative fashion in adults. Hence the necessity of operation.

ALBANUS.

353. This is a very complete study of the above subject, including the frequency of the various symptoms and complications, based on observations of five hundred cases.

HAENEL.

354. JARECKY reports four cases of adenoids in babies of from eight to ten weeks old, and a fifth in a syphilitic child eight days old. He operates on babies with a special curette, the cutting surface being $6\frac{1}{2} : 5\frac{1}{2}mm$ with a depth of $2mm$, set at an angle of 120° to the shaft, about $10mm$ above the bend. The shaft is slightly pliable and has a handle $20cm$ long.

M. TOEPLITZ.

355. The tonsils were removed with a tonsillotome, and the pharyngeal tonsil with Kirstein's knife in a boy eleven years of age. Half an hour after discharge severe hemorrhage occurred from the naso-pharynx, which continued notwithstanding firm packing for six hours and caused the death of the child. Autopsy showed it to be a case of leukæmia.

BRUEHL.

PHARYNX AND MOUTH.

356. WASSERMANN. A congenital pharyngo-palatal diaphragm. *Arch. f. Laryngol.*, vol. xv., part 3.
357. CHAUVEAU (Paris). Absence of the right anterior pillar and of the right tonsil. *Arch. internat. d'otol.*, etc., vol. xviii., p. 232.
358. FONK (Chile). Clinical contributions on the disappearance of the motor innervations of the uvula. *Arch. f. Laryngol.*, vol. xvi., part 1.
359. SCHIFFERS (Lüttich). A retro-pharyngeal abscess and diphtheria. *Arch. internat. d'otol.*, etc., vol. xviii., p. 433.
360. UFFENHEIMER (München). On the symptoms and bacteriology of membranous angina (usually called Vincent's or Plant's angina). *Münchener med. Wochenschr.*, 1904, Nos. 27, 28.
361. STONE. A new pathogenic throat organism. *Med. Record*, Aug. 13, 1904.
362. LJUBIMOW. On the action of salicylate of soda on the course of anginas. *Wojenno-medizinski Shurnal*, 1904, No. 5.
363. ZIEGNER (Halle). On the surgical treatment of tonsillar abscesses. *Münchener med. Wochenschr.*, 1904, No. 19.
364. NEWCOMB. Bone and cartilage in the tonsil. *Med. News*, Sept. 24, 1904.
365. COMPAIRE (Madrid). A calculus of the left palatal tonsil. *Arch. internat. d'otol.*, etc., 1904, vol. xviii., p. 155.
366. WRIGHT. Actinomycosis of the tonsils. *Amer. Jour. Med. Science*, July, 1904.
367. HENRICI. Amputation of hypertrophic palatal tonsils with a cold snare. *Münchener med. Wochenschr.*, 1904, No. 14.
368. MIODOWSKI (Breslau). On the histology of tonsil appendages. *Arch. f. Laryngol.*, vol. xv., part 3.
369. BAUROWICZ. On the diagnosis of gummatous tumor of the palatal tonsils. *Arch. f. Laryngol.*, vol. xvi., part 1.
370. SREBRNY (Warsaw). Thrush in healthy adults. *Arch. f. Laryngol.*, vol. xvi., part 1.
371. ACHWLEDIANI. A new case of recovery from noma by pyoktannin. *Medicinskoje Oshosvenje*, 1904, No. 17.
372. CHAPPELL. Four unusual tumors in the naso-pharynx. *The Laryngoscope*, Aug., 1904.
373. CRANDALL. A case of Vincent's angina and stomatitis. *Jour. Amer. Med. Assoc.*, July 23, 1904.

356. A woman, seventy-one years of age, with pulmonary phthisis (there were no signs of acquired or congenital syphilis); two bands were observed to travel behind the posterior palatal arch, from the upper free border of the soft palate, in direct continuity on the right and left sides of the uvula, direct to the posterior pharyngeal wall. This deformity presented an opening of about 1 cm broad. The naso-pharynx normal. ALBANUS.

357. The author observed accidentally in a man, thirty-five

years of age, the absence of the right anterior palatal arch and of the right tonsil. No disturbance. OPPIKOFER.

358. After the report of 142 cases of abnormal positions of the uvula, statistics of the very manifold etiology are given. The condition occurred 41 times in affections of the soft palate and of the pharynx, lymphomata of the neck, otitis, dry nasal catarrh, struma, laryngitis, pulmonary tuberculosis 19, variola, syphilis 6 times, influenza, measles, and scarlet-fever. In diseases of the nervous system, especially diphtheria, paralysis of the facial nerve, deformity of the skull, supraorbital neuralgia, spinal irritation, neurasthenia. General diseases: anæmia, chlorosis, rickets, general weakness, and alcoholism. Most frequently observed in youthful age, occasionally congenital. In some cases the condition seems to have a local cause (direct injury to the nerves and muscles of this part), though it generally depends upon distant disturbances of innervation. A cause for the nervous disturbances is also to be found in anæmia, chlorosis, weakness, rickets, and neurasthenia. ALBANUS.

359. In a boy, four years of age, following tonsillar diphtheria, a retropharyngeal abscess occurred. Incision. The pus contained diphtheria bacilli. Recovery. OPPIKOFER.

360. Five cases of Vincent's angina, which were all one-sided and of mild course. Bacteriological examination revealed the fusiform bacillus and spirochete, which, notwithstanding much endeavor, could not be cultivated in pure culture. The fusiform bacillus only grew in sterile human saliva. Transmission to animals and human beings was without result. SCHEIBE.

361. In an epidemic, during the winter of 1903-1904, STONE saw eighty-one cases of acute inflammation of the throat, accompanied by severe toxæmia, lasting from twenty-four to forty-eight hours, ushered in with chilliness, pain in head and limbs, and much sneezing. The tonsils were swollen and often covered with a false membrane. In all cases appeared a peculiar diplococcus in the throat, with its adjacent sides flattened. They readily stain by the Loeffler, fuchsin, and the Gram method. On agar, round regular colonies grow; on blood serum and potato there is also luxuriant growth. Animal inoculations show the organism pathogenic for laboratory animals. M. TOEPLITZ.

362. In sixty-four cases, salicylate of soda exerted a beneficial action on the course of this disease. SACHER.

363. Especially in cases with ankylosis of the jaw, a lancet bent to an angle like a paracentesis needle is recommended.

SCHEIBE.

364. NEWCOMB removed, in a woman, aged thirty, the right tonsil without incident; a few days later, the tonsillotome drove through the left tonsil, striking a hard substance. A small, rounded tip of bone was found in the removed tonsil. It belonged to the styloid process, the remainder of which could be easily made out by palpation. Newcomb discusses the publications on this subject, and also those on bony and cartilaginous deposits scattered through the tonsils. A bibliography is appended.

M. TOEPLITZ.

365. A woman, forty-three years of age, suffered since childhood from frequently recurring angina. Difficulty in smelling and the sensation of a foreign body lasted for six weeks. Nasal voice, disagreeable breath from the mouth. The left tonsil appears like a tumor, so that at first the diagnosis of sarcoma was made. The extracted tonsil calculus was as large as a chestnut, of gray color, and uneven surface. After removal of the calculus a tablespoonful of pus was discharged from the depths of the tonsil. Recovery.

OPPIKOFEK.

366. WRIGHT reports the case of a boy, aged twelve years, who, after the removal of his tonsils, remained well, no metastasis having shown itself. In the sectioned tonsil one cavity was found. The minute, well-illustrated microscopical description shows an abscess cavity occupying a large area. In the cavity are seen the peculiar striated kernels, the striations being more marked at the edges. Under higher power there appear the edge of one of the striated clumps (Drusen) and the peculiar branching, club-shaped rays of the actinomyces group, and through the blur and granulations of the interior of the clump the characteristic lace network. The ends of the actinomyces are pointed directly into the epithelium, the cells of which are also fragmented. The reticulum of the lymph cells is succumbing to the "granulation" process. The infecting germ is located in a tonsillar crypt. It excretes a toxin, which causes proliferation and disintegration of the epithelium. The cavity of the crypt is thus painlessly enlarged. The remaining, greater, part of the paper is occupied with an historical consideration of the actinomyces, its relationship to the tubercle bacillus, its port of

invasion (most frequent in mouth and pharynx), and the protective influences, which prevent the annihilation of the race.

M. TOEPLITZ.

367. HENRICI recommends the cold snare to remove tonsillar hypertrophies. The tube in Krause's snare must be unusually strong; the ends of the wire must be firmly fixed. SCHEIBE.

368. 1. In a girl, eleven years of age, there was a tumor, 12mm long, 4mm broad, the shape of an egg, covered with firm, grayish-red mucous membrane at the site of the left tonsil. It proved to be histologically an angio-fibroma. 2. A man, forty-one years of age, presented on his right tonsil an appendage as large as a pea, with a short root, which upon examination proved to be a plug of exudate in process of organization. 3. A boy, six years of age, showed an ovoid pedunculated tumor, 1½ by ½cm, in place of the right tonsil. 4. A boy, ten years of age, had an appendage as large as a pea attached to the right tonsil. Both proved to be true ad-tonsils. 5. In a girl, eight years of age, a globular tumor, as large as a walnut, hung down from its attachment to the lymphoid tissue of the tubal ostium. Its greatest diameter measured 3cm; its weight was 12g. On examination it was a hypoplastic ad-tonsil. The pharyngeal tonsil was also hypoplastic. ALBANUS.

369. The author has observed a man, forty-five years of age, who complained of occlusion of the right nose and coryza. In the naso-pharynx there was a smooth, elastic tumor, as large as a pigeon's egg, which had been observed for three months, and which occupied the region of the palatal tonsil and the left posterior palatal arch. The diagnosis of fibrolipoma was made. Three months later, the patient complained of tension in the neck, pain in the direction of the left ear. On examination, the cervical glands were not enlarged. The tumor was of the same size. In the direction of the tongue it was greenish-yellow in color. A probe passed through this covering into a large cavity, which contained a dirty-green putrid fluid. This was followed by relief. After the administration of iodid of potash for five days the picture was that of a broken-down gumma cavity, 2cm deep, with a yellowish exudate. ALBANUS.

370. The author saw this rare disease in adults in a young man, twenty-eight years of age, who was perfectly healthy, who in three days after an alcoholic debauch, when he had vomited, presented a deep-red mucous membrane in the mouth. The soft

palate, the tonsils, and the mucous membrane of the cheeks were covered with many small white spots. No fever. Recovery in two days. The second case was that of a rather anæmic woman, twenty-three years of age (in the sixth month of pregnancy, no vomiting), who had been repeatedly hoarse during the last three weeks, and had suffered from pain in the neck. In the left tonsil and the left palatal arch there was a whitish exudate, which disappeared after treatment with tincture of iodine. In both cases the diagnosis was formed by the microscope. The cases reported in literature are collected.

ALBANUS.

371. This was a very severe case of noma in a child three years of age. A compress of 1 % pyoktanin solution was applied, the ulcerating process was arrested, and sequestration occurred.

SACHER.

372. In Case 1, a girl, aged fifteen years, the tumor completely filled the naso-pharynx, and was attached to the posterior end of the right inferior turbinated body. It was 2" long, 1½" wide, and ½" thick. It was an œdematous polyp. In Case 2, a young man, aged fifteen years, the tumor extended 1½" below the soft palate, chiefly on the left side, and was attached by pedicle, ½" long and ¼" thick, to the left tonsillar region, near the Eustachian tube. It measured 40:30:10mm after removal. It was an enormous exaggeration of the mulberry hypertrophies of the posterior extremities of the inferior turbinal, containing, as a unique feature, a number of lymph nodes. This lymphangiectasis was due to the enormous size of the growth, and the formation of the pedicle, which caused defective nutrition, or possibly congestion. Case 3 was a large adenoid growth, apparent below the free border of the soft palate. Case 4 was an unusually large pharyngeal tonsil, in a child two years of age. The microscopical examinations of all these cases were made by Dr. Jonathan Wright.

M. TOEPLITZ.

373. A medical student, twenty-three years old, had at first pain in deglutition, the left tonsil being congested. On the second day, a small white spot was seen, which later on enlarged to ¼" in diameter, and was covered by a grayish-white pseudo-membrane, remaining six days. On the fourth day the gums were quickly and thoroughly inoculated, incident to cleaning the teeth by a dentist, and showed traces of the disease for six weeks. The fusiform bacillus and a spirillum, *spirochæta dentium*, were found in the smears.

M. TOEPLITZ.

Fig. 1.

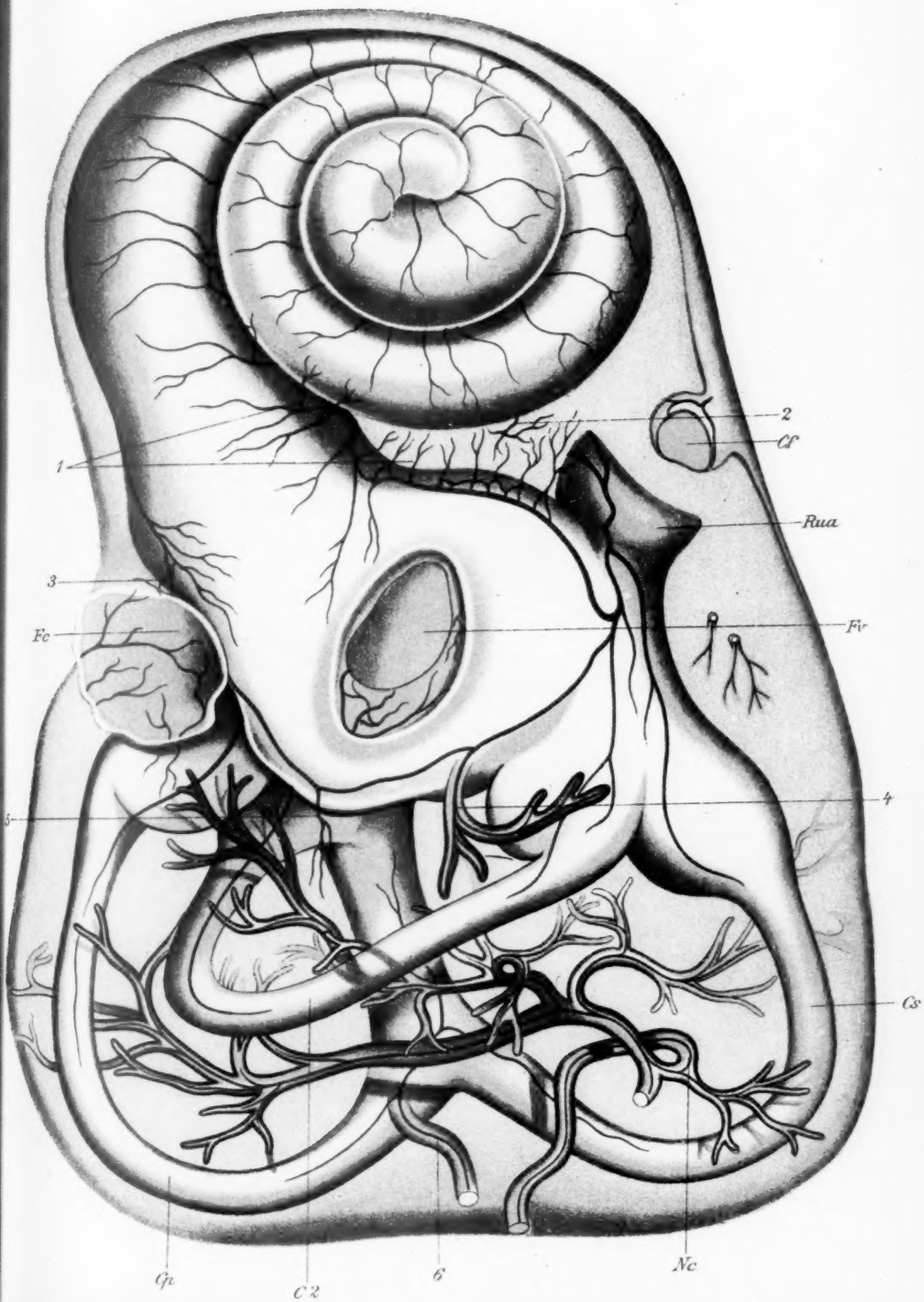


Fig. 2.

